PB-229 850

INTERSTATE POLLUTION OF THE COOSA RIVER (GEORGIA-ALABAMA). CONFERENCE HELD IN ROME, GEORGIA ON AUGUST 27, 1963

Public Health Service
Washington, D. C.

27 August 1963

DISTRIBUTED BY:

NTIS
National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 229 850

CONFERENCE

ON

INTERSTATE POLLUTION

OF THE

COOSA RIVER

[GEORGIA-ALABAMA]

ROME, GEORGIA

AUGUST 27, 1963

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

374

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

CONFERENCE

In the matter of:

Pollution of the interstate waters of the Coosa River and its tributaries, involving the States of Georgia and Alabama and the Department of Health, Education, and Welfare, held at the Courtroom, Federal Building, Rome, Georgia

August 27, 1963

* * *

Murray Stein, Chairman
Public Health Service
Washington, D. C.

John R. Thoman, Regional Program Director
Division of Water Supply and Pollution Control
Department of Health, Education, and Welfare
Atlanta, Georgia

Dr. John H. Venable, Director
Georgia Department of Public Health
Atlanta, Georgia

Dr. Ira L. Myers, State Health Officer
Alabama Water Improvement Commission
Montgomery, Alabama

TABLE OF CONTENTS

page

Opening Statement by Chairman Stein 1

Report by Mr. West 4

Discussion of Mr. West's Report 170

Statement by Dr. Myers 184

Report by Mr. Beck 185

Discussion of Mr. Beck's Report 256

Statement by Mr. Meade 260

Statement by Judge Formby 261

Statement by Mr. Mobbs 264

Statement by Mr. Sommers 265

Statement by Mr. O'Neil 266

Statement by Mr. Stone 266

Statement by Mr. Hunt 267

Statement by Mr. Trotter 267

Statement by Mr. Kelley 268

Statement by Mr. Chestnut 268

Statement by Mr. Parker 269

Statement by Mr. Meade 269

Statement by Mr. Kelley 271

Statement by Mr. Byrd 272

Statement by Mr. Farley 273

Discussion of Mr. Farley's Statement 274

AFTERNOON SESSION

page

Discussion: Mr. West and Dr. Venable, Chairman Stein and Mr. Thoman 277

Statement by Dr. Venable 280

Discussion: Chairman Stein and Dr. Venable 281

Statement by Mr. Hardeman (City of Trion) 289

Discussion: Chairman Stein and Mr. Boston 290

Statement by Mr. Robertson (Riegel Textile) 292

Discussion of Mr. Robertson's Statement 293

Statement by Mr. Espy (Summerville, Ga.) 298

Statement by Mr. Barnham (Summerville, Ga.) 300

Statement by Mr. Hamler (Rome, Ga.) 301

Discussion of Mr. Hamler's Statement 301

Statement by Mr. Rodgers (Pepperell Mfg.) 302

Discussion of Mr. Rodgers Statement 303

Discussion: Chairman Stein, Messrs. Rodgers, Thoman, Fairall and Dr. Venable 307

Statement by Mr. McSwiney (Rome Kraft) 312

Report by Mr. Minch (Rome Kraft) 314

Discussion of Mr. Minch's Report 327

Summary: Chairman Stein 329

Discussion of Summary 363

Adjournment 370

PROCEEDINGS

CHAIRMAN STEIN: The conference is open.

This conference in the matter of pollution of the interstate waters of the Coosa River and its tributaries, involving the States of Georgia and Alabama and the Department of Health, Education, and Welfare, is being held under the provisions of section 8 of the Federal Water Pollution Control Act.

Under the provisions of that Act, the Secretary of Health, Education, and Welfare is required to call a conference of this type when on the basis of reports, surveys, and studies, he has reason to believe that pollution of interstate waters subject to abatement under the Federal Act is occurring.

The purpose of the conference is to bring together the state water pollution control agencies, the representatives of the Department of Health, Education, and Welfare, and other interested parties to review the existing situation, the progress which has been made, and to lay a basis for future action by all parties concerned, and to give the states, localities and industries an opportunity to take any remedial action which may be indicated under state and local law.

The conference technique is rather an old one. It is used by many state agencies informally in the normal conduct of their business in the field of water pollution control. The concept of a conference was proposed by the United States Supreme Court as long ago as 1921 in the famous case of New York against New Jersey involving interstate pollution.

I would like to quote from the court opinion, and I quote:

> "We cannot withhold the suggestion inspired by the consideration of this case that the grave problem of sewage disposal presented by the large and growing population living on the shores of New York Bay is one more likely to be wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the states so vitally concerned in it than by proceedings in any court, however constituted."

We strongly support the conference technique and we measure our success by the situations which are solved at the conference stage rather than by the court actions we bring.

Under Section 8 of the Federal Water Pollution Control Act, the Secretary of Health, Education, and Welfare has notified the official state water pollution control agencies of the conference. These agencies are the Georgia Department of Public Health and the Alabama Water Improvement Commission.

Georgia will be represented by Dr. John Venable, and the State of Alabama by Dr. Ira Myers.

Mr. John Thoman, who is the Regional Program Director, Division of Water Supply and Pollution Control of the Department of Health, Education, and Welfare, with headquarters in Atlanta, Georgia, has been designated as the conferee for the Federal Government.

My name is Murray Stein. I am from Washington, D. C., headquarters of the Department of Health, Education, and Welfare.

The representatives of the official agencies are privileged to bring whomever they wish to the conference and have them participate in the conference. However, this is a conference between the state agencies and the Department of Health, Education, and Welfare, and these parties constitute the conferees.

Both the states and the Federal Government have responsibilities in dealing with interstate water pollution control problems. The Federal Water Pollution Control Act declares that the states have primary rights and responsibilities for taking action to abate and control interstate pollution. It has always been the policy of the Department of Health, Education, and Welfare to give full recognition to this traditional role of the states. The function of the Department is to encourage the states in these activities. However, the Department of Health, Education, and Welfare is charged by law with specific responsibilities in connection with interstate pollution control problems.

The Federal Water Pollution Control Act provides that pollution of interstate waters, whether the matter causing or contributing to such pollution is discharged directly into such waters, or reaches such waters after discharge into a tributary of such waters, which endangers the health or welfare of persons in a state other than that in which the discharge originates, is subject to abatement. The conference will be useful, we hope, in providing a clear picture of the problem in the Coosa River, in delineating the progress which has already been accomplished, and in indicating what still needs to be done to correct the problem in these interstate waters.

Under the Federal law the Secretary is required at the conclusion of the conference to prepare a summary of it, which will be sent to all conferees. The summary, according to law must include the following:

1. Occurrence of pollution of interstate waters subject to abatement under the Federal Act;

2. Adequacy of measures taken toward abatement of the pollution; and

3. The nature of delays, if any, being encountered in abating the pollution.

Subsequent to the holding of a conference, the Secretary of Health, Education, and Welfare is required to make recommendations for remedial action if such recommendations are indicated.

Now a word about the procedures governing the conduct of the conference. A record and verbatim transcript will be made of the conference.

Mr. Roy M. Leonard is making this stenographic transcript for the purpose of aiding us in preparing a summary, and also providing a complete record of what is said and done here. We will make copies of the summary and transcript available to the official state water pollution control agencies of Georgia and Alabama. We have found it is best that generally for the purposes of maintaining relationships within a region and a state for the people who wish transcripts of the conference to do this through their state agency, rather than coming directly to the Federal Government for that. The reason for this is that we would prefer the people who are interested in this problem to follow their normal relationships in dealing with state agencies rather than coming to the Federal Government on these matters when the conference has concluded. This has worked successfully in the past, and we will be most happy to make this material available to the states for distribution.

All the conferees will be called upon to make statements. The conferees, in addition, may call upon participants they have invited to the conference to make statements. At the conclusion of such statements, the conferees will be given an opportunity to comment or ask questions. This procedure has proven effective in developing a clear statement of the problem in the past and in reaching agreements on equitable solutions.

At the end of all the statements we will have a discussion among the conferees and try to arrive at a basis of agreement on the facts of the situation. Then we will attempt to summarize the conference orally, giving the conferees, of course, the right to amend or suggest modifications of the oral summary.

At this point we would like to call on Mr. Thoman for the Department of Health, Education, and Welfare; but first, I would like to indicate that any person making a statement, if called on by one of the conferees, should come up to the lectern and identify himself before making the statement, so we may have a complete record.

Mr. Thoman.

MR. JOHN THOMAN: Thank you, Mr. Stein.

I would like, first, to introduce a few of the government representatives who are here today.

First of all, Mr. Robert Brown, who is Deputy Regional Director of the Department of Health, Education and Welfare in Atlanta.

Dr. H. B. Cottrell, who is Regional Health Director of Public Health Service; and Mr. Howard Chapman, who is the Associate Regional Health Director for Environmental Health; and Mr. Carl Harper, who is the Regional Attorney for the Department of Health, Education, and Welfare, is also here.

For the information of the people who are attending, there are representatives here from the Corps of Engineers Division Office in Atlanta, the Mobile District Office; Mr. Carreker, from the Agriculture Research Services, Department of Agriculture; Mr. Cameron from U.S.G.S.; Mr. Wigglesworth of the Southeastern Power Administration.

Without further prolonging the sessions, I would like to call on Mr. Al West, of the Field Investigation Section from Cincinnati, to present the Federal Government's report.

Al.

REPORT ON COOSA RIVER SYSTEM

By A. W. West, Public Health Engineer

MR. WEST: Thank you, Mr. Thoman. I think I will move this over here.

Chairman Stein, conferees, and ladies and gentlemen:

During August 1962 a pollution evaluation survey was conducted on the Coosa River System. The findings, discussions, summaries and conclusions are included in the January 1963 "Report on Coosa River System, Georgia-Alabama."

I would like to have this report entered in the record as the official document of the August 1962 survey.

CHAIRMAN STEIN: Without objection.

This document has been supplied to the state agencies for their review and comments before this; is that correct?

MR. WEST: That is correct. And furthermore, a copy of this report has been sent by the state agencies to all communities, industries, agencies and organizations mentioned in the report, or known to have a special interest in the water quality of this area.

Since most of you here today have already had an opportunity to study this document, I will at this time try and present a summary of the study and the findings, but will not read the report in its entirety.

Paging through the report, the first section is "Background."

And here, the waters of the Coosa River System produce hydroelectric power, form recreational areas for the enjoyment of fishing, swimming, and other water sports, and are used as sources for domestic and industrial water supplies. They are also used for the disposal of domestic sewage and industrial wastes.

During recent years an increasing number of complaints allege that pollution of these waters is interfering with recreational use, retarding the development of potentially valuable lake shore property, and damaging the appearance and general aesthetic appeal of these rivers and upper Lake Weiss.

Fish kills caused by industrial waste discharges are summarized in this report.

The scope of the 1962 survey, first of all, the purpose, why we are here:

During August 1962 the Public Health Service and other cooperating agencies conducted field surveys to determine whether pollution entering the waters in the State of Georgia endangers the health or welfare of persons in the State of Alabama, and constitutes interstate pollution.

Now we will set up a few of these posters to illustrate some of the narrative in the report. Figure 1 --

CHAIRMAN STEIN: Mr. West, do these figures correspond to the figures contained in your report?

MR. WEST: My figure numbers correspond directly to the numbers given in the printed document.

CHAIRMAN STEIN: Okay, if we are going to reproduce the report we will not reproduce the figures twice for purposes of the record. These figures generally are the most expensive problem in the reports reproduced. Also, I see you have some color. All reproductions for the purpose of the record will be in black and white.

MR. WEST: I think these colors will be easier to see in the conference, but the reproductions are in black and white, here. They are black and white reproductions of these posters you see.

Now here again is a map showing the area of the study. The waterways involved in this interstate pollution evaluation survey are shown on this Location Map No. 1.

The Chattooga River Survey started about 3 miles above Trion, Georgia, and extended across the state line into the waters of Lake Weiss.

The Oostanaula sampling station, established 1½ miles above the confluence with the Etowah River, is located above all sewage and industrial waste outfalls entering the Oostanaula from the Rome area.

The Etowah River study started at a point immediately below Allatoona Dam near Cartersville, Georgia, and extended downstream to the confluence with the Oostanaula River in Rome, Georgia.

The Coosa River study extended downstream from Rome, Georgia, across the Georgia-Alabama state line and through Lake Weiss in the State of Alabama.

The Chattooga River above Trion, the Oostanaula River above Rome, The Etowah River above Allatoona Dam, and Cedar Creek in the vicinity of Cedartown were not included in this survey. Preliminary investigations indicated that wastes discharged upstream from these cut-off points exerted no direct damaging effect on the Coosa River waters flowing across the Georgia-Alabama state line. But here we wish to emphasize that omission from this interstate study does not in any way imply that excessive local pollution may not have occurred in some of these reaches. That is the function of the Georgia State Board of Health; not the interstate study.

Sources of Data:

The August 1962 field survey data included in this report were collected by two participating field parties. The Public Health Service of the U. S. Department of Health, Education, and Welfare conducted stream surveys on the Chattooga, Coosa, Oostanaula and Etowah Rivers in the State of Georgia. On the Chattooga and Coosa Rivers, these studies extended downstream, across the state line and into the State of Alabama.

A field study team from the Alabama State Water Improvement Commission conducted field investigations of Lake Weiss and the lower reaches of the Chattooga River and the Coosa River impoundment. In the immediate vicinity of the Georgia-Alabama state line certain sampling station locations were used by both field survey groups.

This next statement I hardly know how to state, honestly, because we had such generous help by so many people in this area, the state agencies, the federal agencies, the local agencies, cities, the industries -- and just an awful lot of help. So I will try and summarize by saying representatives of many other organizations, who we tried to identify in the report, but too numerous to mention here, were unusually generous in providing assistance, information and general support to the study program. Some of these things we just couldn't have done without all the help and support that was given our field group while we were down here in Rome, Georgia.

Water Uses:

The rivers and lakes in this area are used principally to generate hydroelectric power, serve as a source of industrial and domestic water supply, and provide water sport recreational facilities.

Industrial water supply is drawn from the rivers by:

New Riverside Ochre Company

Thompson Weinman Company

Celanese Corporation

Rome Kraft Company

Cartersville, Rome, Cedar Bluff and Gadsden obtain their domestic water supply from the rivers.

Recreation:

Construction of the Alabama Power Company Dam across the Coosa River near Centre, Alabama, in 1961 created the Lake Weiss impoundment. This reservoir covers some 31,000 acres and includes approximately 440 miles of shore line. More than 100 homes, costing an estimated $800,000, were built on the shores of this lake during the first year and about 200 additional lots were acquired for access to and enjoyment of this lake.

The Chattooga and Coosa River waters of Lake Weiss are used for swimming, fishing, boating, water skiing and other water contact sports. It is expected that the recreational use of these waters will expand at an accelerated pace as more and more lake shore property is developed and more access areas are provided.

Principal Waste Discharges:

The principal sewage and industrial waste discharges into the reaches of the Coosa River System under consideration are listed on Table No. 1. Here, the pollutional strength of these wastes is expressed in population equivalents, or P.E., which permits expression of both domestic sewage and organic industrial waste loading in common units. For example, if we talk about an industrial waste with a population equivalent of 1,000, we mean that this waste has the same pollutional strength as the raw sewage discharged from a community of 1,000 people.

Now here I am going to look at Table 1, which is in the report, and again try and summarize it.

On the Chattooga River there are sewage discharges from Trion, Georgia; but the principal organic wastes discharged into the river come from the Riegel Textile Mill in Trion. There is a 112,000 population equivalent discharge, which represents 89% of the total organic pollutional load discharged to the Chattooga River in the study area.

Trion, for instance, had 3,000 population equivalent.

Going downstream, Summerville, Georgia discharges about 3200 P.E. Then, Montgomery Knitting Mills, Summerville Manufacturing Company, 400 and 600 respectively, and Georgia Rug Mill, 6,000; Berryton, Georgia, and some others that are very small.

Then, on the Etowah River the principal discharge here is inorganic silt, and here during the study period the principal discharge was approximately 500 tons of mineral washings per day from the New Riverside Ochre Company. In here the Thompson Weiman Company also discharges wastes, but their wastes were minor, 0.14 tons of mineral washings per day during the survey.

CHAIRMAN STEIN: There is no reason for you to stand back there (addressing the crowded audience). Why don't you take some of the chairs up here and sit down?

Go ahead.

MR. WEST: Coming down the Coosa River, both sewage and industrial wastes were considered here. Rome, Georgia discharges approximately 40,000 population equivalents of raw sewage. The Celanese Corporation discharges an undetermined amount in the river which is estimated to approximate 60,000 population equivalents.

The rest of the textile and miscellaneous industries discharge approximately 21,000 population equivalents; and the Rome Kraft, which discharges the principal or the largest amount of pollution, discharges 243,000 population equivalents of treated paper mill waste to the Coosa River. This is the effluent from the large treatment plant that Rome Kraft operates on their grounds; but, even so, two-thirds of the total organic loading to the Coosa River comes from Rome Kraft.

At Silver Creek Lindale has a sewage treatment plant which has about 350 P.E. coming down the river, and approximately 5,000 population equivalents from the Pepperell Manufacturing Company in Lindale.

The effects of the sewage discharged from Cartersville were local rather than interstate.

River Water Quality:

Now we would like to discuss river water quality and the damage to water use. Here we break this up between the Chattooga River and the Coosa River.

First of all, the 5-day biochemical oxygen demand. All right, this 5-day biochemical oxygen demand, or the B.O.D. as we call it, is simply a measure of the dissolved oxygen that is used up by unstable organic material in water.

The B.O.D. of the Chattooga River waters from above Trion, Georgia, and down into Lake Weiss in the State of Alabama is shown on Figure 3, a figure that is included in the bound report. But I will describe this figure to you.

In Trion, Georgia, above the sewage outfall and above the Riegel Textile plant waste outfall, the B.O.D. averaged 2 mg/l. About 1 mile below Trion the average B.O.D. increased sharply to 38 mg/l.

CHAIRMAN STEIN: Mr. West, let me interrupt again.

MR. WEST: Yes, sir.

CHAIRMAN STEIN: I see there are a lot of people in the audience who are not familiar with the technical terms. Rather than go through these technical terms, I think what Mr. West and possibly the other people who are making statements will do, they are using measurements of pollution, such as dissolved oxygen, coliform, biochemical oxygen demand, which hopefully they will explain very briefly as he did here. But I would like to indicate that all these terms are standard terms used in standard methods as indicators of pollution, and that they are not something erotic or esoteric made up by the investigators here. They are the standard measures and techniques used throughout the United States, and I might say the Western World in examining the pollution problem.

Mr. West.

MR. WEST: Thank you, Mr. Stein.

So we have this B.O.D. of the river going up to a very large river B.O.D. This is extremely high -- 38. As shown in the accompanying dissolved oxygen summaries, the large pollutional load, primarily from the Riegel Textile plant, greatly exceeded the pollution assimilation capacity of the Chattooga River and seriously depleted the dissolved oxygen for 21 miles downstream.

Now may I add one more word of explanation. When we talk about B.O.D., we are talking about what is going into the river and what does the river look like, but the real effect of this B.O.D. is: What does it do to the dissolved oxygen in the stream? So here we are talking about a cause, where it came from, and really the next thing is the important thing, we will now talk about the dissolved oxygen. What does this B.O.D. associated with these wastes do to the river? That is the key to the whole discussion.

Now we are talking about dissolved oxygen. In order to support fish and other beneficial aquatic life, streams must contain dissolved oxygen. It is generally agreed that most game fishes, including bass and bluegills, require at least 4 to 5 mg/l. If the D.O. is suppressed significantly below 4 mg/l, the aquatic environment becomes unsuitable for the propagation of many species. At various D.O. levels below 3 mg/l, fish will leave the oxygen deficient areas or die. Obviously, all fishes and most other normal aquatic life will be killed where decomposing organic pollution removes all dissolved oxygen from the stream.

The Alabama State Water Improvement Commission has set a minimum dissolved oxygen requirement of 4 mg/l to protect the fisheries and recreational values of the waters within the state.

Now, Harold, if we could have this next chart. We will now discuss Figure No. 4, which again is reproduced in the report in black and white. I think it will illustrate what we found in the Chattooga River. On the upper graph we are showing the trend of the dissolved oxygen. As you can see here, above Trion the dissolved oxygens vary from 5 to 7, and right above Trion they went up as high as 9. In other words, this water up here is almost completely saturated with dissolved oxygen, and the shaded circles were put on here to show what percentage of the time the dissolved oxygen was equal to or less than this minimum requirement of 4 mg/l. Furthermore, some of these sections had gone down so low that we thought it might be of great interest to show what percentage of the time the dissolved oxygen was entirely used up and there was zero dissolved oxygen in the stream. That is shown by these shaded areas. So going down the stream, we can see here from this other curve, you can see the pattern. You can see what the dissolved oxygen did to the stream. Below Trion it pulled it down below zero, and then it recovers at Lyerly and starts going up; and, following these diagrams down here, I think I will read some specific figures from the report now because it is important that you know what these values were. But, this shows dissolved oxygen sags, how many times the dissolved oxygen was below 4 and how many times the dissolved oxygen stabalized at zero.

Above Trion the Chattooga River waters were almost completely saturated with dissolved oxygen. Incidentally, to give you an idea of what saturation is when we talk about these various values; at 23° C., the temperature that we found the stream, a saturated stream would contain about 8.7 mg/l. That will give you some ball park figures to realize where we are when we are talking about saturation and how low it goes below that.

Organic wastes, primarily from the Riegel Textile Corporation in Trion, drastically reduced the dissolved oxygen resources of the Chattooga River. Three miles below this waste discharge the average dissolved oxygen concentration dropped to 2.4 mg/l, and 93% of all samples collected at this station contained less than 4 mg/l.

Eight miles below this waste discharge -- that's the next ball down there -- and one mile below the Summerville outfall, the dissolved oxygen averaged 1 mg/l. At this station over half -- that's the second circle, second shaded circle there -- the third shaded circle down there -- over half, or 57% of all samples collected were entirely devoid of dissolved oxygen. 85% of the samples contained less than 4.0 mg/l. This severe oxygen deficit was caused almost entirely by process wastes from the Riegel Textile Corporation.

Two miles below the Summerville outfall sewer the dissolved oxygen concentration increased slightly to 1.3 mg/l, but again 57% of the samples were devoid of dissolved oxygen and 85% were less than 4.0 mg/l. In fact, the only samples showing significant quantities of dissolved oxygen were collected on Sunday or early on Monday mornings before the normal industrial waste discharges from the Trion area reached this section of the stream.

Downstream from Lyerly the stream began to recover, but remained in critical condition at the state line.

Two miles above the Georgia-Alabama state line the dissolved oxygen content averaged 3.8 mg/l, but again more than half of the samples contained less than 4.0 mg/l. Beyond this point the average dissolved oxygen content improved, but at Gaylesville, Alabama, some 9 miles below the state line, more than 50% of the samples contained less than 4 mg/l of dissolved oxygen.

The dissolved oxygen data and the previously discussed B.O.D. results show that the Chattooga River is grossly polluted by sewage and industrial wastes. The most severe effects occurred in the vicinity of Summerville, Georgia. The decomposing organic materials reduced the dissolved oxygen below the survival level for fish and aquatic life. Although stream recovery started at Lyerly, Georgia, the quality of the interstate waters passing the Georgia-Alabama state line remained critical. More than one-half of the samples collected 1 mile above the state line and 9 miles below the state line at Gaylesville, Alabama contained less than the 4 mg/l minimum dissolved oxygen requirement.

Next we will discuss pH because we ran pH on these streams and on the Coosa River, also. pH, or the hydrogen ion concentration -- again one of those terms that we use, and the results are useful in our evaluation of the streams -- the hydrogen ion concentration, or pH, is quite simple. It indicates the degree of acidity or alkalinity. For example, the pH scale goes from 0 to 14, and if we have a pH of 7,right in the middle; that means it's neutral. As the pH increases up the scale from 7 to 14 or thereabouts, that means the waters are excessively more and more alkaline. As the pH scale goes down from 14, down to the minimum of 0, which is the minimum, the waters are shown to be more and more increasingly acid. So it indicates how alkaline or how acid the waters are.

Fish and other aquatic life can tolerate moderately acid and alkaline wastes in the pH range from about 5.4 to about 8.5.

The pH of the river entering Trion, Georgia, averaged 7.2. That is almost neutral. Alkaline wastes from the Riegel Textile plant increased the average pH to 9.7 at the Highway No. 27 bridge 1 mile below Trion. The pH averaged 9.0 at the first station below Summerville and 8.0 in Lake Weiss.

The alkaline wastes increased the pH of the river between Trion and Summerville area to levels that can destroy or seriously inhibit aquatic life. The pH values of waters flowing across the state line and through Lake Weiss, however, were satisfactory.

Then we have another section here on color and physical appearance.

The color of the Chattooga River water below Trion changed from day to day according to the type, volume and intensity of dye stuffs included in the textile mill waste discharge. At times the river was deep blue, almost black. At other times it presented a dirty gray appearance, and on one occasion the river turned brilliant green. The colors faded perceptively in the downstream reaches from below Summerville to the state line. A variety of colors, mostly grays and greens, but much less intense than those observed upstream, were at times present near the state line. At the Highway 35 bridge at Gaylesville, Alabama, the waters were generally much greener than above the state line. The green color at this station, however, was caused by algae growths in this embayment of Lake Weiss.

Pollution by textile mill wastes has degraded the appearance of the Chattooga River and has made many sections of the stream unattractive for scenic and recreational use.

Now we will talk about coliform bacterial density. Here again, I am referring to a Figure No. 5 which was included in the printed report, but we didn't reproduce it on a poster form. Here we are talking about the most probable number of coliform bacteria per 100 ml of sample that were found at the Chattooga River sampling stations.

The coliform bacterial density generally indicates the extent to which waters are contaminated by domestic sewage. It is commonly accepted that river water used as a source of domestic water supply should contain less than 5,000 coliform bacteria per 100 ml before treatment. For swimming and other water contact sports, a commonly accepted upper limit is 1,000 per 100 ml.

The coliform density of Chattooga River waters entering Trion averaged 5,000 MPN/100 ml. One mile below the Trion raw sewage discharge, the concentration increased to 19,000 per 100 ml. Two miles below the Summerville sewer outfall the average increased to 185,000 MPN/100 ml. The averages then decreased to 7,400 two miles above the state line and 6,000 three miles below the state line. At Gaylesville, Alabama, some 9 miles below the state line, the coliform density averaged 1800 MPN per 100 ml.

Here again, sewage from Trion and Summerville, Georgia, contaminating the Chattooga River down across the state line and into the State of Alabama, increased the coliform content above the maximum levels considered satisfactory for water contact sports.

Biological studies. Now if we could have Figure 6, please.

Figure 6 basically is an isometric chart showing the changes in the numbers of species found on the bottom of the river and the number of varities of species, how great a population of the various bottom organisms, and to indicate the intensity of the population and the number of species.

Clean waters support -- and here is the reason for the evaluation -- clean waters support a wide variety of benthos or bottom dwelling organisms which are exacting in their habitat requirements.

Bottom dwelling organisms are directly subjected to any substance which may enter the environment. Excessive organic wastes will produce drastic changes within the benthic community. If organic pollution becomes severe, there is an immediate reduction in both the species and the total population of organisms. A short distance downstream the number of species remains low because only tolerant forms can withstand conditions within this river bottom, and the total population increases because of a rich, abundant, constant food supply of organic wastes, and a marked decrease in predation within the biotic community.

Severely toxic wastes will eliminate all benthic organisms from a given environment. Moderately toxic wastes, on the other hand, will eliminate those organisms most susceptible to the substance.

The bottom dwelling biota observed on the Chattooga River from above Trion, Georgia, to Gaylesville, Alabama, during the August 1962 survey is illustrated in this Fugure 6. As you see, Trion is in the upper right-hand corner, and we see the progressive changes going down to the Alabama state line.

Figure 6 shows many different kinds of organisms, predominately immature insects intolerant of pollution above Trion.

Three miles below Trion there were no bottom dwelling organisms of any kind. All life had been killed by the toxic textile mill wastes.

Two miles below Summerville only those tolerant organisms which can survive in polluted water were found. Sludge worms predominated.

Stream recovery started below Lyerly, and two miles above the state line a normal benthic population was encountered.

This biological report is included to show the extreme effects of pollution in the reach from Trion to 2 miles below Summerville. It in itself, as one test, was not indicative of pollution at the state line.

The interstate effects of this pollution are shown in the dissolved oxygen and coliform bacteria summaries, which come later.

That about concludes the detailed discussion of the Chattooga River, and now we will report on the findings in the Etowah, Oostanaula and Coosa Rivers, which are included as one section of the report.

In the 1962 studies -- Harold, if we may have the Figure No. 8 now. We will talk about dissolved oxygen again. Here again, we have a similar type of dissolved oxygen display. There were no zero dissolved oxygens. So here the shaded areas show the percentage of times that the dissolved oxygen fell below the minimum requirement of 4 mg/l. This is also shown in the bar diagram and the curve, extending down the river system.

The dissolved oxygen characteristics of the Etowah, Oostanaula and Coosa Rivers are illustrated on Figure No. 8.

Etowah River water is withdrawn from the depths of the Allatoona impoundment where there is little or no dissolved oxygen during a portion of the year. For about five to ten miles below the dam the low dissolved oxygen concentrations and the pollution discharges discussed elsewhere made the river unsuitable for the propagation of fish and other normal aquatic life.

For a distance of 3½ miles below the dam the D.O. remained consistently below 4.0 mg/l. Those are the two heavily shaded areas there. Some 9 miles below the dam natural reaeration had increased the average D.O. to 4.7 mg/l, but 25% of the samples contained less than 4.0 mg/l. Throughout the next 35 to 40 miles to Rome the river contained adequate D.O., as the averages increased to 7.6 mg/l. There we can see, as it is coming into Rome, we have the open circle indicating a satisfactory dissolved oxygen condition.

Sewage and industrial wastes from the Rome area lowered the dissolved oxygen about 0.6 mg/l throughout the next 14 miles to the sampling station located about one mile above Rome Kraft Corporation.

Two miles below Rome Kraft the D. O. remained above 4.0, but downstream from this point and past the Georgia-Alabama state line the oxygen demand of the paper mill wastes and the residual organic loading from Rome exceeded the dissolved oxygen resources and reaeration capacity of the river. The shaded circles on Figure 8 show that the D.O. fell below 4.0 mg/l frequently throughout the 8-mile reach extending from 3 miles above the state line to Poole's Ferry, 5 miles below the state line. In this reach almost half of all samples contained less than the minimum D.O. requirement of 4.0 mg/l. That is this group of samples, right in here, crossing the state line. Furthermore, the extreme lows at three of these stations above, at, and below the state line dropped to the dangerously low levels of 1.8 and 1.9 mg/l. That is less than 2 ppm, and that is illustrated on the little bar graph above.

The dissolved oxygen reductions shown in this Figure were caused by the decomposing organic wastes. During this study of the Coosa River there were no special studies made to determine the detailed relative effects of upstream flow regulation at Allatoona Dam, the downstream impoundment in Lake Weiss, the heat added by Plant Hammond, the reduction in photosynthesis by silt, and the lowered temperature of the water from Allatoona Lake on the oxygen balance.

Now if we can have the next chart, please. (Fig. 9.)

When we set up this, we thought it might be very interesting to see how the river water quality compared with some of the historical work done by the Alabama Water Improvement Commission.

During 1954 the Alabama Water Improvement Commission obtained base line data on the stream before wastes were discharged to the Coosa River by the paper mill at Rome. This study -- that really is that 1954 line, the topmost black line on the curve. This study, extending from the state line to below Centre, Alabama, was repeated in 1955 and 1957 after the paper mill started operation, but before Lake Weiss was impounded. The D.O. data collected during these three surveys are shown on Figure 9. The results of the 1962 surveys were added to illustrate the total trend from 1954 through the current 1962 survey. There you see the darker lines overlayed upon the historical results obtained by the folks in Alabama.

These curves show how the organic wastes, primarily from the paper mill, have progressively lowered the dissolved oxygen concentrations below the state line in 1955 and 1957. During the 1962 survey, the effects of increased waste loading and decreased stream reaeration further reduced the D.O. at the state line to the previously reported minimum value of 1.8 mg/l.

Sewage and industrial waste pollution from the Rome area and the Rome Kraft plant has frequently reduced the Coosa River and upper Lake Weiss dissolved oxygen content below levels considered suitable for fish propagation.

Conditions were critical during August 1962. If the declining dissolved oxygen trend continues, extensive fish and aquatic life habitats below the state line will be destroyed.

Now we will move on and discuss the coliform bacterial density in the Coosa River. Here I am referring to another Figure which is in the printed text itself. This Figure shows that the sewage from Rome contaminated the Coosa River waters down to and across the state line. One mile below Rome the coliform count jumped to 150,000 MPN/100 ml. Concentrations were reduced during the next 25 river miles to 3,500 coliform bacteria per 100 ml and remained in the state waters flowing past the state line. Thus, sewage from Rome made the Coosa River unsatisfactory for water contact sports from Rome down to five miles below the state line.

Now we will deal with a special section on suspended sediment in the rivers. This is really kicked off by our section on biology, because the biology contains some of the information on the Coosa, but lays the groundwork for the sedimentation problem on the Etowah and Coosa Rivers.

Now if you will set up Figure 11, please.

Biological studies -- Bottom organisms:

The effect of organic wastes and toxic substances on the benthos, or bottom organisms, was described in the Chattooga River discussion. Additional factors influence the benthic population of the Etowah and Coosa Rivers.

Deposition of silt and other particulate matter on the stream bottom adversely affected the quantitative and qualitative distribution of the benthos.

The paucity of benthic organisms existing in the Etowah and Coosa Rivers is illustrated on this Figure 11. Well, just from the general impression, you can see how small the bar graphs are on the upper right, there. Only a small number of species was found at each of the sampling stations. Furthermore, most of the benthic organisms were tolerant of pollution; that is, sludgeworms, midges, and associated forms.

The benthic population was extremely low in the Etowah River. Immediately below Allatoona Dam a few very tolerant forms were found. The silty mineral washing wastes discharged by the New Riverside Ochre Company created a bottom unsuitable for most benthic forms; and, although a few species of intolerant, immature insects were found in the riffle areas, low populations persisted for the remaining length of the river.

In the Oostanaula River just above Rome, above the Rome water intake, the majority of the species were pollution intolerant, which are normally associated with cleaner waters. It is significant that certain of these clean water forms were not found in any similar habitat in the Etowah or Coosa Rivers.

From four to seven miles below Rome there is a 6-fold increase in the sludgeworm population. This showed the adverse effects of the raw sewage and industrial waste discharges from Rome and associated industries.

Except for low numbers of pollution sensitive hellgrammites, immature cadisflies and mayflies in the swift current below Mayo's Dam, the rest of the river contained low numbers of pollutional tolerant forms, such as sludgeworms, midges, nematodes and an occasional leech.

Studies have shown that destruction of fish food organisms is frequently a serious limiting factor, and an inadequate food supply is a most common cause of poor fishing quality in lakes and streams alike.

This study demonstrates the impact of the silt and sand deposition upon the biota, both in restricting biotic development to certain pollution tolerant forms and limiting the total production within the biotic population. This unfavorable feature of the aquatic environment persists down to and across the state line into Alabama.

Then the biologists studied the algal content of the water.

Algae and vegetation are affected by silt principally by covering the bottom material with a layer of sediment, a reduction of light transparency and prevention of light penetration, and a grinding action of the particles. A reduction of plant food is accompanied by a reduction on the poundage of plant-feeding animals that can be supported, and this in turn limits the production of fish. Algae are the foundation of the fish food chains. Shad, for example, live on algae and in turn are food for the game fishes.

Now if you will put up Figure 12, please, which illustrates the algal population, the light transmission, and the silt deposits.

Within the body of the report there is a detailed description, describing the observed adverse effect of silt turbidity on the development of an algal population, and these conditions are illustrated on Figure 12.

The algal population was low in the Etowah River.

The algal population of the Oostanaula was ten times more abundant than at any place sampled on the Etowah River. Upon entering the silty Coosa River, however, these algae started to die off, with a reduction in both kinds and numbers down to and across the state line. All groups were adversely affected by the unsuitable environment.

The biological report now comments directly on silt.

Silt damage to adult fish by sedimentation has not been proven. In most cases indirect damage to the fish population through destruction of the food supply, eggs, or changes in the habitat probably occur long before adult fish are directly harmed.

It has been found that silt is not very dangerous to fish eggs and developing fry in the normal stream if excess occurs only at intervals. However, the character of such normal streams can be drastically altered by allowing the washings of quaries, gravel pits, mines, etc., to flow into the stream untreated. Continuous application of even small quantities of silt over spawning beds may be extremely detrimental to the welfare of very young fish. From a practical standpoint the damage to fish spawning areas occurs when mining silt enters a stream at times other than storm periods and when the water velocity is insufficient to carry the sediment in suspension.

Silt was found in the center of the channel adjacent to Poole's Ferry in Lake Weiss and in the downstream vicinity. A depth of 10½ inches of accumulated silt was found in the bottom at Poole's Ferry in the Coosa River. Approximately one mile downstream the channel deposition had been reduced to 4 inches, and other mile downstream 3 inches of silt were found.

Then, they also checked up on barium, which occurs in the mineral ores, but not in the soil erosion sediments; and this barium was used to trace the deposition of mineral washing waste solids in the Etowah and Coosa Rivers. Barium was found in the Etowah and Coosa River core samples; that is, they dug down and picked up cores of the bottoms of all these rivers. But barium was not found in core samples collected from the Oostanaula River and Pumpkinvine Creek above Highway 41.

These data indicate that mining silts containing barium, that are introduced into the Etowah River, are carried into the Coosa River eventually reaching the upper end of Lake Weiss in Alabama. Greatest silt deposition of 10½ inches occurred near the upper end of Lake Weiss at Poole's Ferry, where 4.7 mg/g of barium was found. The largest concentration of barium was found in the New Riverside sludge pond, where there was 10.8 mg/g. In the Etowah River two miles below the New Riverside waste outfall, there was 7.0 mg/g of barium.

Now we will talk directly about suspended sediment loads. This is a sediment study of the Etowah and Coosa Rivers.

Knowledge of periodic wastes discharge schedules and cyclic river flow patterns is necessary for an understanding of the suspended sediment loads in this river system.

As far as waste loads, the New Riverside Ochre Company discharges about 500 tons per day of clay into the Etowah River between Allatoona Dam and Cartersville. This plant operated on a five-day workweek from Monday through Friday. Clays washed from raw ore flowed to an intermittent holding pond during each operating day. At about 8:00 P.M. each evening, low level sluice gates were opened and the ponded wastes were sluiced to the river during a 45 to 60 minute draining period.

Operations at this plant during the August survey appeared similar to those observed during the earlier July 1962 preliminary survey. Most solids discharged to the river during the evening periods of low river flow settled out and remained in the discharge area overnight. When the Allatoona Dam turbines were opened the next morning, the swift turbulent river current scoured the river bottom, resuspended the settled solids and carried the accumulated clay and silt load downstream.

The Thompson Weinman Company processes barites ores at their Paga Mines near Cartersville. Clays washed from the raw ores are discharged to three large holding ponds covering some 160 acres. Supernatant liquor withdrawn from these ponds enters the Etowah River near the Cartersville sewer outfall.

These waste holding ponds were observed on July 18 during the preliminary survey. One pond had been drained to the bottom of the outlet control box and small quantities of silty wastes continued to flow out through the leaking gate structure. A large depression had been scoured out of the exposed accumulated sludge mass. This cavity in the pond bottom and the presence of mud shoals along the sides of the outlet ditch showed that large quantities of clay had been sluiced through the holding pond and out into the river. This condition was called to the company's attention and the pond operating procedure was corrected shortly thereafter.

During the August survey, Thompson Weinman Company exercised diligent supervision over these ponds and obtained excellent solids removal efficiencies. In fact the suspended solids concentration of eight samples, collected from the pond with the greatest outflow, ranged from 15 to 105 mg/l, for an average of 34 mg/l. Based on a total estimated outflow of one million gallons per day, this would amount to only 0.14 tons of solids per day. These results prove that with proper supervision and operation, waste holding ponds can practically eliminate mineral washing silt pollution of the Etowah River.

These observations also point up, however, the need for replacement of the gate structure, with facilities for automatic water level control in the ponds.

Some such facilities should be provided to assure continuous high solids removals and eliminate any possibility of periodic sluicing of accumulated solids to the river during accidents or during faulty pond operations.

The next discussion is on the river discharge. Harold, if I may have the next chart, Figure 13. This will give you some idea why we have excessive clouds of silt that may clear up as they go down the river.

Hydrographs showing the diurnal discharge variations at the Etowah River sampling stations are shown on this Figure 13. These hydrographs and the 1962 stream surveys are based on provisional discharge data furnished by the U. S. Geological Survey and the U. S. Army Corps of Engineers.

Minimum Etowah River flows of approximately 300 cfs occurred throughout the evening and early morning hours when the Allatoona Dam turbines were shut down. During the August special study period, the first turbine, releasing approximately 3500 cfs, was opened at about

11:00 A.M. Then, the second turbine was opened at about noon, and the flow increased to 8,000 cfs. At 2:00 o'clock the first turbine was shut down and the flow gradually subsided from 5,000 to 4,000 cfs. At 6:00 P.M. the second turbine was shut down and the river flow again returned to 300 cfs.

Right here, for instance, that shows the typical pattern following down through the river. The first curve on the top, for instance is 3½ miles below Allatoona Dam, where we have loads of 300, going right up to 7,300, and then tapering off as described. The next one is similar, similar and similar; and then 6½ miles above Rome, that's the third from the bottom figure, you see the pattern is the same. But now we only have a variation of -- I say "only," it's still a big variation -- from 700 to 4500. Then the Oostanaula River, that straight line, is a relatively constant flow, and it added to the Etowah produces an undulating flow in the Coosa, where it ranges from 2,000 to 4600 cfs, but the peaks are not as sharp.

Now if I could have the next two Figures, please. We will put them both up together, Figure 14 and Figure 15. These other charts show the flow of discharge. This Figure here shows the total suspended solids of the river throughout various times of the day at various stations down the river. Now that is based on quite an extensive survey period. The samples were collected at least every half-hour throughout three days at the significant stations above, and at less frequent intervals, but throughout the cycles all the way down the Coosa River System.

For instance, the upper chart, two miles below New Riverside Ochre Company, shows how the level of suspended sediment is relatively low during the night and early morning hours. It has settled out and there is not enough velocity to keep on pushing it downstream, but, as soon as the turbines come on, it immediately builds up these solids and raises them up to levels as high as 900 mg/l, and then pushes this downstream, and again subsides later on.

The second chart there shows the conditions below New Riverside -- below both New Riverside and Thompson Weinman. Here the pattern is the same; that is, the pattern of the cycle, but the range is from 10 to 750. Then going down, we see how this pattern subsides until we get down to the Oostanaula above Rome. There the range is from 20 to 120, and down across the state line it's from 15 to 50 for an average of 30.

Incidentally, I didn't discuss the top line. There we have an average of about 12 mg/l, while these others range up as high as 900. The other chart there shows the combined effect of this varying flow and the varying concentrations to give an estimated mass, a total mass of solids that are actually flowing down the river system. Here again, on Figure 15 we can see that the Etowah River water coming out from Allatoona Dam contained approximately 56 tons of suspended solids per day. Immediately below New Riverside operations the peak jumps up to a total of 550 tons of solids throughout the average 24-hour cycle of this study.

The next station is below Thompson Weinman, and here the value is 549 -- very similar. There is practically no change between these two stations, and there was no change between the average concentration reported previously.

This amount of solids falls gradually, as some of it becomes settling and moves down as a rolling bed-load. At the mouth of the Etowah there is still 329 tons of solids per day. The little load graph over there shows about 125 tons of silt coming in from the Oostanaula River, and these two combine to again show about 365 tons of silt at the start of the Coosa, tapering off, and about 257 tons per day flowing down the system below the state line.

Local fishermen and property owners advised members of the survey team that they had never seen the Coosa River and upper Lake Weiss nearly so clear as it appeared during this August 1962 survey. During the July 1962 preliminary survey the appearance of the Coosa River and upper Lake Weiss was considerably more turbid and dingy than in August. The Etowah River was much more turbid and highly colored, especially during the daylight hours. In fact, during July there was a distinct line of demarkation between the reddish, muddy-appearing Etowah River and the relatively clear Oostanaula River at their confluence.

Then we have another section here with charts, tables, etc., which I will try to summarize and compare what we found with some of the 1961 data.

The report here discusses the results of Oostanaula and Etowah River turbidity readings collected from August 8 to September 20, 1961, by the Rome City Water Department.

This data revealed that during this 1961 period the Etowah River was about 2½ times as turbid as during the August 1962 survey, and indicates that more mineral washing waste than could have been produced by the New Riverside Ochre Company alone were discharged to the river during August and September of 1961.

Then,during this survey we heard comments about other probable causes of silt turbidity. We investigated a number of them and they are reported in detail. I will try and summarize them.

First of all, we heard that the silt was caused by Allatoona Dam operation. We have a lot of information on dam operating records, about suspended solids concentrations above, below and throughout the 12-month cycle; and from this, this next section of the report discusses the Allatoona Dam operation, and it is concluded that the Etowah River silt problem is not caused by releases from Allatoona Dam.

Road Bank Erosion:

Studies also revealed that during August 1962 the Etowah River turbidity was not caused by road bank erosion.

Now if we may have another chart up there, please.

Now we will try and get into the heart of the problem and discuss soil erosion. Oh, yes; these are the two I went over quite briefly, but it is also indicated that soil erosion is the cause of the turbidity problem.

This required more information, and again, we had a tremendous amount of data from Soil Conservation Service and Research Associates folks in Athens, Georgia. I can't mention them all, but we took this data, combined it, tabulated and analyzed it, and here is what we found. It is pretty much illustrated on Figure 19.

Turbidity and the total sediment load of the Etowah and Coosa Rivers is related to normal soil erosion as well as the man-made discharge of solids into this river system. Research studies, field findings, and general information provided by the many cooperating agencies were correlated to determine the probable amounts of eroded soil reaching the Etowah River. This is shown graphically on Figure 10, which shows the relationship between the New Riverside wastes and soil erosion during the survey period. These little dark spots show the amount of soil erosion entering the Erowah River from the various sub-drainage basins in terms of tons per day, and the big black or shaded circle shows the amount of solids entering the river from the New Riverside waste discharges. This shows that the 494 tons per day New Riverside discharge, that's the big gray circle up there, represents about 8½ times the 57 tons per day total soil erosion that is introduced into the Etowah River during the August 1962 survey period. So there during this period of the year the man-made wastes are 8½ times as much as the soil erosion entering the system.

Harold, now maybe we can put up the next two.

These form a uniform combined pattern. They are all set up to show relationships. Figure No. 20 was set up to compare this man-made silt discharge from New Riverside with all sources of suspended solids. This time we said, "All right. We've been talking about soil erosion, but how about the solids contained in the sewage from Rome, Georgia, or the solids from Rome Kraft, or in the natural waters of some of these other rivers?"

Here again, these are all equated in terms of tons per day. The little dot, for instance, down over there, shows that about 56 tons -- the same 56-ton figure we talked about before, coming from the Etowah River through Allatoona Dam and down through the water -- that is about 56 tons per day. And this other little dot down here is 24 tons from Pumpkinvine Creek, etc. The big dot again is the discharge from New Riverside Ochre Company. Here again, relating the big dot against the sum of all other known sources of solids entering the river, we find that this 494 tons per day of suspended solids discharged by New Riverside approximates three-quarters of the total 634 tons per day of solids moving down the river system, all the way down the Coosa River System.

Then, I think the next chart will pretty much wind up the silt discussion. It's up there, Harold.

Here we have Figure 21 which was set up to show these relative influences of the mineral wastes, the percentage of the solids that can be attributable to these wastes that are discharged into the river, and what per cent of the silt at various downstream stations is composed of the silt that was discharged way up in the Etowah River.

Starting at the first big shaded ball on the left, we see that about 90% of the sediment going down the river comes from New Riverside. The other 10% is natural Etowah River turbidity coming down through Allatoona Dam. As we get down to the mouth of the Etowah and Rome, we then want to show the effect of soil erosion as well as the turbidity coming in from above Allatoona Dam. Here, about 8%, the white portion -- 8% of this load is due to soil erosion. 17% is due to the silt coming down from above Allatoona, but here again 75% of all the silt entering and passing through Rome, Georgia, is composed of the mineral washing wastes of New Riverside Ochre.

Carrying it down one step further, we go below Rome now and we take a look at the Coosa River, and here we must add the silt load from the Oostanaula River. Going around this piece of pie again on the third chart, we see at the top 6% coming from soil erosion and other wastes, 12% coming from the Etowah above Allatoona, 28% coming down the Oostanaula River, and again 54% coming from New Riverside Ochre Mines.

Then, when we get down at the state line, this is a study of interstate pollution. Here again we found a similar pattern, varied by the dilution and the other wastes coming in here at the state line.

A little piece of pie shows that 10% of these wastes come from all other sources, 22% can be attributed to the natural wastes coming down from the Etowah above Allatoona Dam, 23% from the Oostanaula River, and again 45% of the silt in these waters crossing the state line and flowing into Alabama are those residual wastes from the New Riverside Ochre discharges.

This study revealed that during August almost one-half of the turbidity and suspended solids of the Coosa River at the state line and in upper Lake Weiss were discharged to the Etowah River by the New Riverside Ochre Company in Cartersville.

Turbidity data furnished by the Rome, Georgia City Water Department indicated that during August and September 1961 considerably more than one-half of the turbidity of the Coosa River at and below the state line originated from the mineral wastes discharged into the Etowah River.

These unnatural off-color mineral waste suspensions degrade the physical appearance, reduce the aesthetic value or aesthetic appeal, and interfere with full enjoyment of the recreation potential of the Coosa River and upper Lake Weiss.

We have gone through the details of the report, and, with your permission, I would like to summarize and express the conclusions of the report. These I will read directly.

A. Scope of Surveys, Discussions, Summaries and Conclusions:

1. The August 1962 stream surveys were conducted primarily to evaluate interstate pollution of the Coosa River System.

2. Local pollution problems requiring correction also were observed during the course of this study. These intrastate problems are under investigation by the Georgia Department of Public Health, which has direct responsibility for controlling pollution of waters in the State of Georgia.

3. The observed local intrastate effects of pollution were recorded and discussed in the body of this report; but, except where they relate to interstate pollution, these local effects are not included in the following summaries and conclusions.

We start off with:

B. Chattooga River - Organic and Bacterial Pollution:

1. Chattooga River waters were contaminated by raw sewage discharges from the communities of Trion and Summerville, Georgia.

2. The amount of contamination in the Chattooga River near the state line, as shown by the August 1962 coliform bacterial concentrations, is summarized as follows:

(a) Two miles above the state line the coliform content ranged from 1,700 to 22,000 for an average of 7,400 MPN/100 ml.

(b) Three miles below the state line the coliform content ranged from 800 to 35,000 for an average of 6,000 MPN/100 ml.

3. Contamination entering the river in Georgia increased the coliform bacterial content of the Chattooga River in Georgia and Alabama to levels considered unsatisfactory for water-contact recreation.

4. Chattooga River waters were polluted by sewage and industrial wastes from Trion and Summerville, particularly from the Riegel Textile plant in Trion.

5. This pollution reduced the dissolved oxygen concentration of the Chattooga River to zero near Summerville.

6. Approximately one-half of the samples collected 2 miles above and 9 miles below the state line contained less than the 4.0 mg/l minimum dissolved oxygen required by the Alabama Water Improvement Commission.

7. Dye wastes from the Riegel Textile plant produced unnatural, aesthetically offensive off-color blues, blacks and greens in the Georgia reach of the Chattooga River.

8. Pollution discharged to the Chattooga River in Georgia has killed fish in Georgia and Alabama. One major fish kill occurred in November 1961 and another in June 1962. Pollution remains a major threat to fish life in the Chattooga River.

C. Coosa River - Organic and Bacterial Pollution:

1. Coosa River waters were contaminated by raw sewage discharges from Rome, Georgia.

2. The amount of contamination in the Coosa River near the state line, as shown by the August 1962 coliform bacterial concentration, is summarized as follows:

(a) Four miles above the state line the coliform content ranged from 900 to 24,000 for an average of 6,400 MPN/100 ml.

(b) At the state line the coliform content ranged from 1,300 to 10,900 for an average of 3500 MPN/100 ml.

(c) Five miles below the state line the coliform content ranged from 700 to 13,000 for an average of 2,400 MPN/100 ml.

3. Contamination entering the river in Georgia increased the coliform bacterial content of the Coosa River in Georgia and Alabama to levels considered unsatisfactory for water-contact recreation.

4. The Coosa River and tributaries were polluted by industrial wastes from the Pepperell Manufacturing Company at Lindale, Celanese Corporation, Rome and associated industries, and the Rome Kraft paper mill west of Rome.

5. Pollution reduced the dissolved oxygen concentration of the Coosa River at the state line to a minimum of 1.9 mg/l.

6. Approximately one-third of the samples collected at the state line and one-half of the samples collected at stations 1½ and 5 miles below the state line contained less than the 4.0 mg/l minimum dissolved oxygen standard of the Alabama Water Improvement Commission.

7. Pollution of the Coosa River during August 1962 periodically reduced the water quality and the fish and aquatic life environment to critical levels above, at, and below the Georgia-Alabama state line.

D. Silt Pollution:

1. The Etowah and Coosa Rivers were polluted by silt and clay from mineral washing waste discharges.

2. During the August 1962 survey period the turbidity and suspended sediment load of the Etowah River at Rome, Georgia, were considerably reduced below the levels experienced during the previous August and September 1961 season.

3. Results of the August 1962 special round-the-clock suspended sediment load studies are summarized as follows:

(a) Mineral washing wastes from the Thompson Weinman Paga Mines were settled in waste holding ponds. These ponds were supervised diligently during the survey period and the solids removal efficiencies were excellent. The effluent contained 0.14 of one ton of solids per day. This illustrates that mineral washing waste pollution can be effectively eliminated by adequately sized and properly operated waste settling ponds. Additional control structures are required, however, to assure continued high solids removals.

(b) Mineral washing wastes from the New Riverside Ochre Company plant were collected in a small waste holding pond and then sluiced to the Etowah River at the end of each workday. These wastes contained approximately 500 tons of solids per day.

(c) Waste solids discharged by the New Riverside Ochre Company formed 90% of the Etowah River suspended sediment load at Cartersville and 45% of the Coosa River load at the Georgia-Alabama state line.

4. Silt deposits over the river bottom in upper Lake Weiss reach a maximum observed depth of 10½ inches 5 miles below the state line.

5. The bottom organisms and algae, normally serving as fish food, were seriously degraded by the silt load in the Etowah and Coosa Rivers.

6. The unnatural off-color mineral waste suspensions degraded the physical appearance, reduced the aesthetic appeal, and interfered with full enjoyment of the recreational potential of the Coosa River and upper Lake Weiss.

E. Conclusions:

1. Wastes entering the Chattooga River from Trion, the Riegel Textile Corporation of Trion, and Summerville and associated industries, and wastes entering the Coosa River and tributaries from the New Riverside Ochre Company of Cartersville, the Pepperell Manufacturing Company of Lindale, Rome, Georgia and associated industries, Celanese Corporation, Rome, Georgia, and Rome Kraft Company in Georgia endanger the health and welfare of persons in Alabama.

2. This pollution of interstate waters is subject to abatement under the Federal Water Pollution Control Act.

Thank you very much, Mr. Chairman.

CHAIRMAN STEIN: Thank you very much, Mr. West, for your comprehensive statement.

The following is the complete "Report on Coosa River System, Georgia-Alabama" as prepared by the Robert A. Taft Sanitary Engineering Center:

REPORT ON COOSA RIVER SYSTEM

GEORGIA-ALABAMA

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
PUBLIC HEALTH SERVICE
ROBERT A. TAFT SANITARY ENGINEERING CENTER

CINCINNATI, OHIO

JANUARY 1963

FOREWORD

The field survey was directed and the report prepared by A. W. West, Public Health Engineer.

The biological studies were directed and the biological section of the report written by K. M. Mackenthun, Biologist.

Data was processed by C. E. Runas, Senior Assistant Sanitary Engineer, who was Assistant Project Engineer during the survey and report preparation.

The work was performed under supervision of F. W. Kittrell, Engineer-in-Charge, Pollution Evaluation Unit, of the Field Operations Section at the Robert A. Taft Sanitary Engineering Center in Cincinnati, Ohio.

Valuable assistance, cooperation and contributions were generously provided by others on the staff of the Robert A. Taft Sanitary Engineering Center, Atlanta Regional Office, Alabama State Water Improvement Commission, Georgia State Game and Fish Commission, and other participating agencies.

TABLE OF CONTENTS

PAGE NO.

BACKGROUND 1

SCOPE OF THE 1962 SURVEY 4

- PURPOSE 4
- AREA 5
- SOURCES OF DATA 6
- FIELD STUDIES 8

WATER USES 9

- HYDROELECTRIC POWER 9
- WATER SUPPLY 9
- RECREATION 10

PRINCIPAL WASTE DISCHARGES 11

- CHATTOOGA RIVER 11
- ETOWAH RIVER 12
- OOSTANAULA RIVER 14
- COOSA RIVER 14

RIVER WATER QUALITY AND DAMAGE TO WATER USE 16

- RIVER WATER QUALITY 16
  - Chattooga River 16
    - 5-Day Biochemical Oxygen Demand(B.O.D.) 16
    - Dissolved Oxygen (D.O.) 17
    - Hydrogen Ion Concentration (pH) 20
    - Color and Physical Appearance 20
    - Coliform Bacterial Density (MPN/100 ml) 21
    - Biological Studies 24
  - Etowah, Oostanaula and Coosa Rivers 27
    - 5-Day Biochemical Oxygen Demand (B.O.D.) 27
    - Dissolved Oxygen (D.O.) 28
      - 1962 Studies 28
      - Comparison With Previous Surveys 30

TABLE OF CONTENTS
(Continued)

PAGE NO.

Hydrogen Ion Concentration (pH).................... 33
Color.. 34
Coliform Bacterial Density (MPN per 100 ml)....... 34
Biological Studies................................. 36
  Bottom Organisms................................. 36
  Algal Examination................................ 39
  Incident Light................................... 42
  Fish... 44
  Silt... 45

SUSPENDED SEDIMENT LOADS........................... 49

AUGUST 1962 SURVEY................................. 49
  Introduction..................................... 49
  River Discharge.................................. 51
  Suspended Sediment............................... 52
  Variations in Suspended Sediment................. 58

COMPARISON WITH 1961 DATA.......................... 59
RELEASES FROM ALLATOONA DAM........................ 60
ROAD BANK EROSION.................................. 62
SOIL EROSION....................................... 63
  Introduction..................................... 63
  Monthly Variation of Turbidity Due to Soil Erosion.. 63
  Annual Soil Erosion Loss to Etowah River......... 64
  Soil Erosion Rates During Specific Months of the Year 64
  August Soil Erosion Loss vs. Mineral Washing Waste Solids................................ 65

TOTAL SUSPENDED SOLIDS LOADINGS.................... 65
PER CENT OF TOTAL SUSPENDED SEDIMENT LOAD ATTRIBUTABLE TO NEW RIVERSIDE OCHRE COMPANY WASTE DISCHARGES...... 66

SUMMARY AND CONCLUSIONS............................ 69
A. Scope of Surveys, Discussions, Summaries, and Conclusions... 69
B. Chattooga River - Organic and Bacterial Pollution... 69
C. Coosa River - Organic and Bacterial Pollution....... 71
D. Silt Pollution.................................. 72
E. Conclusions..................................... 73

LIST OF TABLES

TABLE NO. FOLLOWING PAGE

1 Estimated Waste Discharges.............. 11

2 D. O. Summary - Chattooga River......... 18

3 D. O. Summary - Etowah, Oostanaula and Coosa Rivers......................... 28

4 Estimated Soil Erosion Delivery to Etowah River............................. 64

5 Total Suspended Solids Loading.......... 65

APPENDIX

General

A-1 Location Guide..........................
A-2 Data Provided by Rome Kraft Company.....

Chattooga River

A-3 Summary PHS Survey Data.................
A-4 Summary Alabama Survey Data.............

Etowah, Oostanaula and Coosa Rivers

A-5 Summary PHS General Survey Data (Etowah)
A-6 Summary PHS General Survey Data (Coosa).
A-7 Summary Alabama Survey Data (Coosa).....
A-8 Algal Counts............................
A-9 Incident Light..........................
A-10 Pre-Impoundment Fish Population Summary.
A-11 1962 Electrofishing Survey.............
A-12 Bottom Sediments.......................
A-13 Barium in Bottom Sediments.............

LIST OF TABLES
(Continued)

TABLE NO.

A-14 River Discharge Records..................

Suspended Sediment Loads

A-15 Suspended Sediment Load (Above Mayo's Lock and Dam)...............................
A-16 Approximate Suspended Sediment Load (Below Mayo's Lock and Dam)....................
A-17 1961 Turbidity at Rome, Georgia...........
A-18 Mean Discharge by Months - Oostanaula River at Rome, Georgia........................
A-19 Sedimentation - Etowah River..............
A-20 Oostanaula River Discharge 1960-61........
A-21 Oostanaula River Turbidity - Concentration 1960-61................................
A-22 Oostanaula River Turbidity - Mass - 1960-61

LIST OF FIGURES

FIGURE NO.		FOLLOWING PAGE
	General	
1	Location Map	5
2	Sampling Station Identification Map	5
	Chattooga River	
3	B.O.D.	16
4	D.O.	18
5	Coliform Bacteria	22
6	Benthic Population	25
	Etowah, Oostanaula, and Coosa Rivers	
7	B.O.D.	27
8	D.O.	28
9	D.O. Trend	31
10	Coliform Bacteria	34
11	Benthic Population	36
12	Algal Population, Light Transmission and Silt Deposits	40
	Suspended Sediment Loads	
13	Discharge - Diurnal Variations	51
14	Total Suspended Solids - Diurnal Variations	52
15	Total Suspended Solids - Mass	52
16	1961 Discharge and Turbidity	59
17	1961 Turbidity - Equivalent Mass	59
18	Oostanaula River - Discharge and Turbidity - Per Cent of Annual Average	63
19	Suspended Sediment Load Comparison	65
20	Total Suspended Solids Loading	65
21	Sources of Suspended Sediment	66
	APPENDIX	
	Oostanaula River	
A-1	Precipitation in Drainage Basin	
A-2	Discharge	
A-3	Turbidity - Concentration	
A-4	Turbidity - Mass	

BACKGROUND

The Coosa River, formed by the confluence of the Etowah and Oostanaula Rivers in Rome, Georgia, flows westerly across the State and into the State of Alabama. The Chattooga River flows southwesterly through the State of Georgia and joins the Coosa River System in the State of Alabama some 22 miles below the state line. The power dam constructed near Centre, Alabama, by the Alabama Power Company in 1961 impounds these waters to form the Lake Weiss reservoir.

These waters produce hydroelectric power, form recreational areas for the enjoyment of fishing, swimming, and other water sports, and are used as sources for domestic and industrial water supplies. They are also used for the disposal of domestic sewage and industrial wastes.

During recent years an increasing number of complaints allege that pollution of these waters is interfering with recreational use, retarding the development of potentially valuable lake shore property, and damaging the appearance and general aesthetic appeal of these rivers and upper Lake Weiss.

In addition to complaints by fishermen, lake side business and property owners, and individual civic-minded citizens in both states, resolutions condemning this alleged pollution and calling for effective pollution abatement measures have been passed by the following communities and organizations:

Floyd County Wildlife Association (Georgia)
Chattooga County Wildlife Club (Georgia)
Cherokee County Industrial Committee (Alabama)
Cherokee County Board of Revenue (Alabama)
Cedar Bluff, Alabama, Chamber of Commerce
Town of Cedar Bluff, Alabama
City of Centre, Alabama

Furthermore, large numbers of fish have been killed by pollutional wastes discharged into these streams. Reports on four recent fish kills, investigated by the Georgia State Department of Public Health and the Alabama Water Improvement Commission during 1961 and 1962, are summarized as follows:

Coosa River - On October 18, 1961, a small number of fish were killed by a temporary discharge of untreated paper mill waste from the Rome Kraft Company.

Oostanaula River - On July 20, 1962, large numbers of fish were killed by the accidental discharge of approximately 9,000 gallons of sulfuric acid from the Celanese Fiber Company of Rome, Georgia.

Chattooga River - On November 6, 1961, several thousand dead fish were observed floating down the 6 mile Chattooga River reach above Gaylesville, Alabama. At that time the river was reported to have a dark bluish color and odor resembling dye waste.

On June 13, 1962, another Chattooga River fish kill was investigated and dead fish were again observed at the Henderson Bridge, some 6 miles above Gaylesville, Alabama.

Both of these fish kills in the Chattooga River were attributed to the discharge of pollutional wastes into the upstream reaches of the river.

The Alabama Water Improvement Commission has established minimum standards, including a minimum dissolved oxygen concentration of 4.0 mg/l, for the protection of the Coosa River flowing into the State of Alabama.

SCOPE OF THE 1962 SURVEY

PURPOSE

During August 1962 the Pollution Evaluation Section of the Public Health Service and other cooperating agencies conducted field surveys to determine whether pollution entering the waters in the State of Georgia endangers the health or welfare of persons in the State of Alabama, and constitutes interstate pollution. This interstate concept governed program planning, the location of sampling stations, and the geographical limit of areas to be included in this field survey and report. These studies covered most of the main stem reaches, but did not extend into the uppermost headwaters of the entire river system.

Other waste discharges, contributing to intrastate pollution and currently under investigation by the Georgia State Department of Health, enter the watershed beyond the upstream limits of the August survey. The net pollutional strength of these wastes, however, is materially reduced during the time of travel to the state line. Preliminary data and engineering judgment indicate that the diminished residual effects of these outlying waste discharges do not contribute significally to pollution of the interstate waters entering Alabama.

AREA

The waterways involved in this interstate pollution evaluation survey are shown on Location Map Figure 1. Sampling station locations are shown on Figure 2 and described in the Location Guide Table No. A-1.

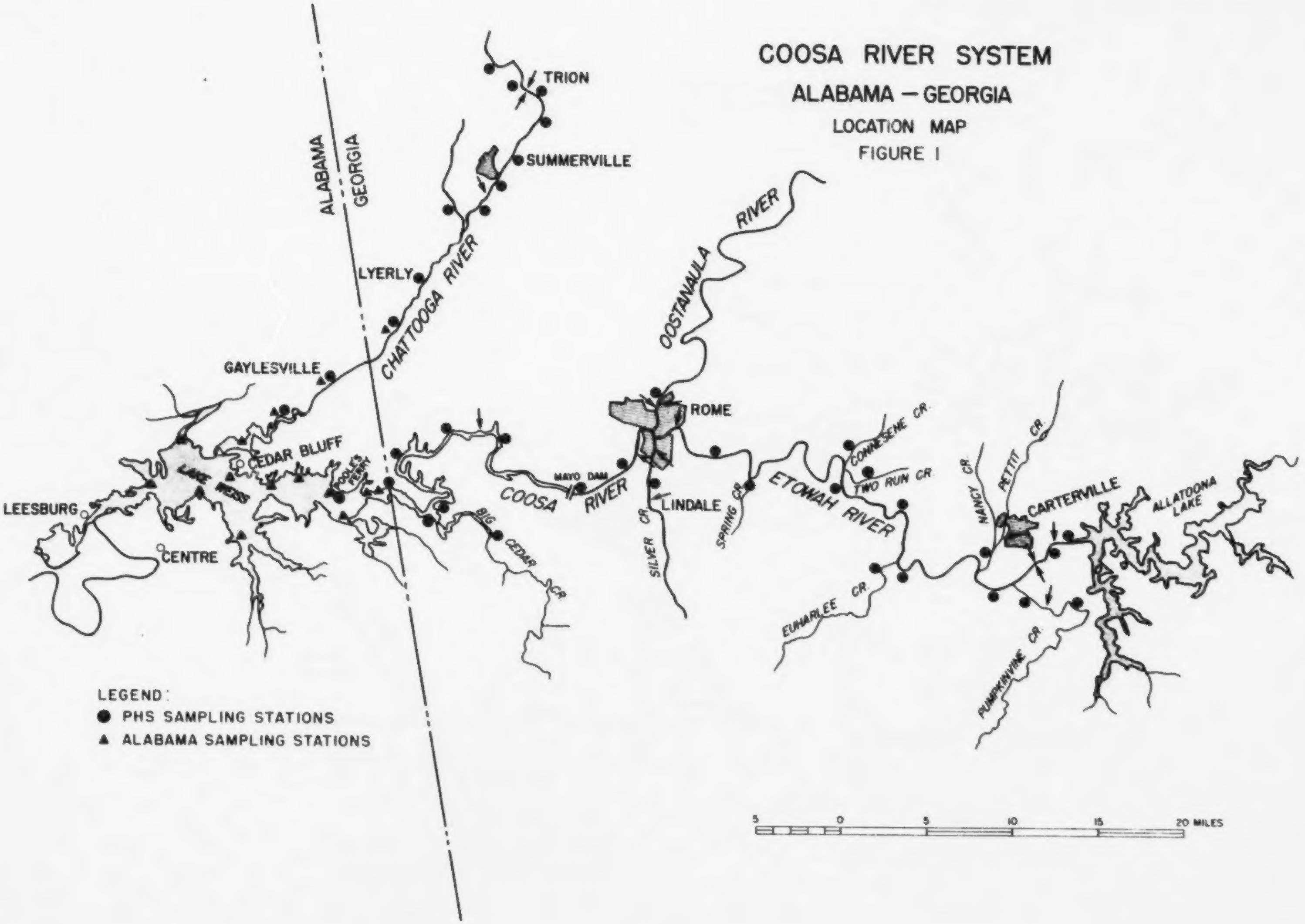
The Chattooga River survey started about 3 miles above Trion, Georgia, and extended across the state line into the waters of Lake Weiss.

The Oostanaula River sampling station, established 1-1/4 miles above the confluence with the Etowah River, is located above all sewage and industrial waste outfalls entering the Oostanaula River from the Rome area.

The Etowah River study started at a point immediately below Allatoona Dam near Cartersville, Georgia, and extended downstream to the confluence with the Oostanaula River in Rome, Georgia.

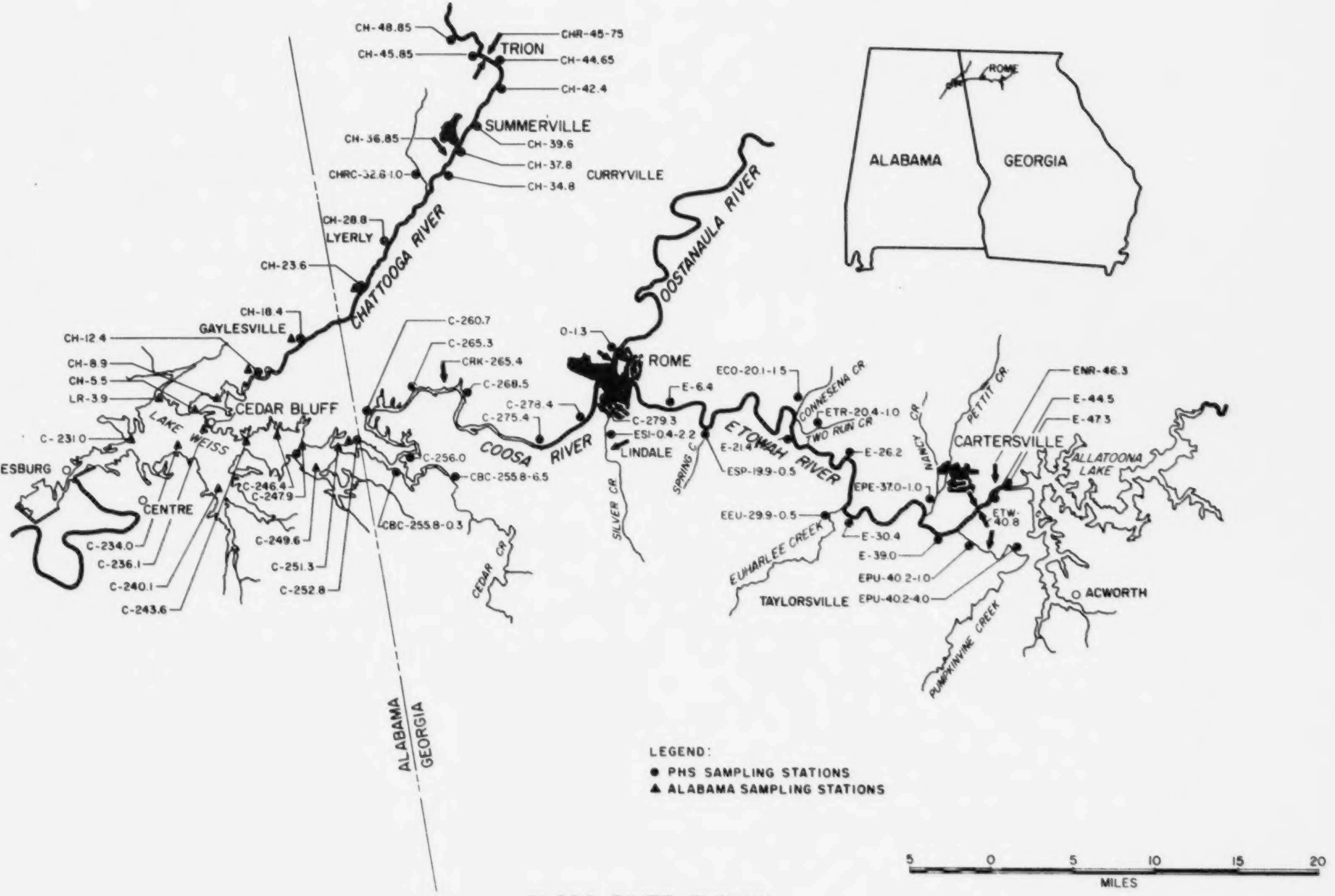
The Coosa River study extended downstream from Rome, Georgia, across the Georgia-Alabama State Line and through Lake Weiss in the State of Alabama.

The Chattooga River above Trion, the Oostanaula River above Rome, the Etowah River above Allatoona Dam, and Cedar Creek in the vicinity of Cedartown were not included in this survey. Preliminary investigations indicated that wastes discharged upstream from these cut-off points exerted no direct damaging effect on the Coosa River waters flowing across the Georgia-Alabama State Line. It is emphasized, however, that omission from this interstate study does not in any way imply that excessive local pollution may not have occurred in some reaches of these streams.



COOSA RIVER SYSTEM
ALABAMA – GEORGIA
LOCATION MAP
FIGURE 1

ALABAMA
GEORGIA
TRION
SUMMERVILLE
LYERLY
CHATTOOGA RIVER
GAYLESVILLE
CEDAR BLUFF
LEESBURG
LAKE WEISS
CENTRE
POOLES FERRY
BIG CEDAR CR
COOSA RIVER
MAYO DAM
OOSTANAULA RIVER
ROME
LINDALE
SILVER CR
SPRING CR
CONNESENE CR
TWO RUN CR
ETOWAH RIVER
EUHARLEE CR
NANCY CR
PETTIT CR
CARTERVILLE
ALLATOONA LAKE
PUMPKINVINE CR
LEGEND:
● PHS SAMPLING STATIONS
▲ ALABAMA SAMPLING STATIONS
5 0 5 10 15 20 MILES


CH-48.85
CHR-45-75
TRION
CH-45.85
CH-44.65
CH-42.4
SUMMERVILLE
CH-36.85
CH-39.6
CH-37.8
CHRC-32.6-1.0
CH-34.8
CURRYVILLE
CH-28.8
LYERLY
CH-23.6
CHATTOOGA RIVER
CH-18.4
GAYLESVILLE
CH-12.4
CH-8.9
CH-5.5
LR-3.9
CEDAR BLUFF
C-231.0
LAKE WEISS
LEESBURG
CENTRE
C-234.0
C-236.1
C-240.1
C-243.6
C-246.4
C-247.9
C-249.6
C-251.3
C-252.8
C-260.7
C-265.3
CRK-265.4
C-268.5
C-278.4
C-275.4
C-256.0
CBC-255.8-6.5
CBC-255.8-0.3
CEDAR CR
COOSA RIVER
ALABAMA
GEORGIA
O-1.3
ROME
C-279.3
ESI-0.4-2.2
LINDALE
SILVER CR
OOSTANAULA RIVER
E-6.4
ECO-20.1-1.5
CONNESENA CR
ETR-20.4-1.0
TWO RUN CR
SPRING C
E-21.4
ESP-19.9-0.5
ETOWAH RIVER
E-26.2
EPE-37.0-1.0
EEU-29.9-0.5
E-30.4
EUHARLEE CREEK
E-39.0
TAYLORSVILLE
EPU-40.2-1.0
EPU-40.2-4.0
NANCY CR
PETTIT CR
ENR-46.3
E-44.5
E-47.3
CARTERSVILLE
ETW-40.8
ALLATOONA LAKE
ACWORTH
PUMPKINVINE CREEK
ALABAMA
GEORGIA
ROME
LEGEND:
● PHS SAMPLING STATIONS
▲ ALABAMA SAMPLING STATIONS
5
0
5
10
15
20
MILES

COOSA RIVER SYSTEM

ALABAMA - GEORGIA

SAMPLING STATION IDENTIFICATION MAP

FIGURE 2

SOURCES OF DATA

The August 1962 field survey data included in this report were collected by two participating field parties. The Public Health Service of the U. S. Department of Health, Education, and Welfare conducted stream surveys on the Chattooga, Coosa, Oostanaula and Etowah Rivers in the State of Georgia. On the Chattooga and Coosa Rivers, these studies extended downstream, across the state line and into the State of Alabama. A field study team from the Alabama State Water Improvement Commission conducted field investigations of Lake Weiss, and the lower reaches of the Chattooga River and the Coosa River impoundment. In the immediate vicinity of the Georgia-Alabama State Line certain sampling station locations were used by both field survey groups.

Georgia State Game and Fish Commission representatives participated actively in the field studies. Biologists and wildlife rangers joined the field survey group and provided most valuable assistance during the biological surveys and the special round-the-clock studies of the Etowah and Coosa Rivers.

During August, and also earlier in the year, the Georgia State Department of Public Health conducted independent stream surveys throughout the entire Coosa River watershed. Although the Georgia State Department of Public Health was unable to participate directly in the Public Health Service-Alabama Water Improvement Commission joint survey, they provided data gathered during their surveys, presented background information, and cooperated in planning and briefing conferences in the Georgia State office.

The Georgia and Alabama Districts of the U. S. Department of the Interior Geological Survey provided provisional river discharge data for the streams under study.

The U. S. Army Engineer District, Mobile, furnished provisional stream discharge data, operating reports on the Allatoona Hydro Plant, and special suspended sediment data for the Etowah River area.

Precipitation records were provided by the Georgia State Climatologist for the U. S. Department of Commerce Weather Bureau in Athens, Georgia.

Representatives of the U. S. Department of Agriculture furnished much valuable background data for the suspended sediment load studies. Soil erosion information was provided by the Southern Piedmont Soil Conservation field station in Watkinsville, Georgia. Estimated sediment rates and soil loss to the streams were provided by the Georgia State Conservationist in Athens, Georgia. The research group of the Coosa Watershed Project in Cartersville, Georgia furnished basic information on erosion from highway road banks.

Rome Kraft Company representatives provided paper mill production, industrial waste discharge and stream survey data collected by their personnel.

Rome, Georgia city officials provided a site for location of the field laboratories and contributed a series of long-term daily turbidity records for the Oostanaula and Etowah Rivers in Rome, Georgia.

FIELD STUDIES

During most of the first 3 weeks in August, routine samples were collected once daily from all sampling stations. A special series of round-the-clock studies were conducted on the Etowah and the Coosa Rivers during the last week in August.

During the initial general survey, samples were analyzed for B.O.D., temperature, D.O., pH, coliform bacteria, turbidity, color, and suspended solids. A biological survey of these waters included studies on bottom dwelling organisms, plankton, attached algae and slimes, and measurements of light penetration and silt deposition.

Samples were collected at more frequent intervals throughout each 24-hour cycle of the special round-the-clock studies. The sampling intervals ranged from every half hour near Cartersville, Georgia, to every 4 hours near the state line. Samples were analyzed for turbidity and suspended solids. B.O.D. and D.O. determinations were also run on selected groups of samples.

WATER USES

The rivers and lakes in the study area are used principally to generate hydroelectric power, serve as a source of industrial and domestic water supply, and provide water sport recreational facilities.

HYDROELECTRIC POWER

Two hydroelectric power dams have been constructed on this watershed. The U. S. Corps of Engineers' Allatoona Power Dam on the Etowah River is located near Cartersville, Georgia. The Alabama Power Company Weiss Power Dam on the Coosa River is located near Centre, Alabama.

WATER SUPPLY

The extent to which these rivers are used as sources for industrial and domestic water supply is shown in the following tabulation of principal existing water supplies:

Industrial		mgd	
Etowah River	New Riverside Ochre Company	0.5	Untreated
Etowah River	Thompson Weinman Company	1.0	Untreated
Oostanaula River	Celanese Corporation	7.0	Treated
Coosa River	Rome Kraft Company	18.0	Treated

Domestic		mgd	
Etowah River	Cartersville, Georgia	2.5	Treated
Oostanaula River	Rome, Georgia	5.0	Treated
Coosa River	Cedar Bluff, Alabama	0.05	Treated
Coosa River	Gadsden, Alabama	10.0	Treated

RECREATION

Construction of the Alabama Power Company Dam across the Coosa River near Centre, Alabama, in 1961 created the Lake Weiss impoundment. This reservoir covers some 31,000 acres and includes approximately 440 miles of shore line. It has been estimated that more than 10 per cent of the entire shore line is suitable for residential and summer home development. More than 100 homes, costing an estimated 800,000 dollars, were built on the shores of this lake during the first year and about 200 additional lots were acquired for access to and enjoyment of the lake. It is reported that 1 acre lots, fronting on the deep clear water portions of Lake Weiss, sell for approximately 2,500 dollars per lot, and that similar size lots abutting deep water in cove areas are selling for about 1,200 dollars per lot.

The Chattooga and Coosa River waters of Lake Weiss are used for swimming, fishing, boating, water skiing and other water contact sports. It is expected that the recreational use of these waters will expand at an accelerated pace as more and more lake shore property is developed and more access areas are provided.

PRINCIPAL WASTE DISCHARGES

The principal sewage and industrial waste discharges into the reaches of the Coosa River System under consideration are listed on Table No. 1.

The pollutional strength of these wastes is expressed in population equivalents, or P.E., which permits expression of both domestic sewage and organic industrial waste loadings in common units. An industrial waste with 1,000 population equivalents, for example, would have approximately the same organic pollutional strength as the raw sewage discharged from a sewered community of 1,000 persons. Similarly, a 1,000 B.P.E., or bacterial population equivalent, represents the number of coliform bacteria that would normally be present in a stream polluted by sewage from a community with a sewered population of 1,000.

CHATTOOGA RIVER

Approximately 89 per cent of the organic waste loading to the reach of the Chattooga River involved was discharged from the Riegel Textile Mill in Trion, Georgia. This mill produces approximately

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

ESTIMATED WASTE DISCHARGES

TABLE NO. 1

CHATTOOGA RIVER

Trion, Georgia	3,000 P.E.	Raw Sewage
Riegel Textile Company	112,000 P.E.	Process Waste
Summerville, Georgia	3,200 P.E.	Raw Sewage
Montgomery Knitting Company	400 P.E.	
Summerville Manufacturing Company	600 P.E.	
Georgia Rug Mill	6,000 P.E.	
Berryton, Georgia	-	
Harriett & Henderson Cotton Mills	35 P.E.	

ETOWAH RIVER

New Riverside Ochre Company	500 tons of Mineral Washings per Day
Thompson Weinman Company	0.14 tons of Mineral Washings per Day

COOSA RIVER

Rome, Georgia	40,000 P.E.	Raw Sewage
Celanese Fiber Company	Undetermined	amt. to Oostanaula River
Textile & Misc. Industries	Undetermined	amt. to City Sewers
Rome Kraft Company	243,000 P.E.	Treated paper mill waste to Coosa River

SILVER CREEK

Lindale, Georgia	350 P.E.	Effluent from complete treatment plant
Pepperell Manufacturing Company	5,000 P.E.	Of textile waste

800,000 pounds per week of cotton fabrics from baled cotton and includes desizing, bleaching, dyeing, printing and finishing operations. Untreated process wastes from this mill with an estimated 112,000 population equivalent were discharged into a small creek leading directly to the Chattooga River. Raw sewage from the City of Trion, with an estimated 3,000 P.E., also entered this reach of the river.

Raw sewage from the City of Summerville, Georgia, with a population equivalent of approximately 3,200 was discharged directly to the Chattooga River. Industrial wastes and, or, sanitary sewage from the Montgomery Knitting Company, Summerville Manufacturing Company, and the Georgia Rug Mill were discharged to the river through the Summerville sanitary sewers. The Georgia Rug Mill, with an estimated P.E. of 6,000, produces about 100,000 square yards of tufted rugs per week from nylon and cotton yarns and part of the production is piece dyed. The Montgomery Knitting Company produces knitted hosiery. The Summerville Manufacturing Company produces cotton duck.

ETOWAH RIVER

Process wastes from mineral, chemical and textile industries and raw domestic sewage from the municipality were discharged to the Etowah River in the vicinity of Cartersville, Georgia. During the August survey, silt from the mining operations were carried downstream into the Coosa River and across the Georgia-Alabama State Line. The effects of organic and bacterial pollution from the Cartersville area were local rather than interstate.

The New Riverside Ochre Company produces about 300 tons of barites per day and 200 tons of ochre per month. Crude ores, trucked from nearby open pit mines, are subjected to ore dressing, washing and floatation operations necessary to recover the commercial product. Mineral washing wastes containing about 500 tons of solids per day are discharged to the Etowah River above Cartersville.

The Thompson Weinman Company produces about 300 tons of barites per day from a matrix of rock, clay and sand obtained from adjacent open pit mines. Wastes from the ore washing operations flow to three large holding ponds covering some 160 acres. Only 0.14 tons of solids per day were discharged from those ponds to the Etowah River during the August 1962 survey.

Two mineral ore washing and classifying plants, one owned by Mosteller Brothers and the other by R. T. Haney and Horace McMicken, are located on the banks of Pumpkinvine Creek south of Cartersville. Wash waters from both plants are normally discharged to a common holding pond. During the August survey these plants were not in full operation, and there were no discharges to Pumpkinvine Creek.

Silver Creek enters the Etowah River in Rome at River Mile E-0.4. All domestic sewage from the Village of Lindale, located at the headwaters of this creek, received complete sewage treatment before discharge into the creek. The strength of this treated sewage is estimated at approximately 350 P.E.

The Pepperell Manufacturing Company of Lindale produces over 20,000,000 pounds of gray goods per year from baled cotton and a small amount of rayon and nylon. Less than half of the production involves wet processes. Yarns are dyed before weaving. Sanitary wastes entered the municipal sewer and an estimated 5,000 P.E. of process wastes were discharged to Silver Creek.

Raw sewage and some industrial waste from Rome also entered Silver Creek and the Etowah River.

OOSTANAULA RIVER

The Celanese Fibers Company plant in Rome produces approximately 16,000,000 pounds of viscose rayon yarn per year from wood pulp, caustic soda and carbon disulfide, and 7,500,000 pounds of cellulose acetate yarn per year from cellulose acetate flake and acetone. Sanitary wastes are treated in septic tanks and discharged to the municipal sewer. Bobbin washing wastes are discharged to a natural lagoon which drains to the Oostanaula River through Burrell Creek. Other process wastes are discharged to a municipal sewer leading to the Oostanaula River.

COOSA RIVER

Untreated domestic sewage and associated industrial wastes from the Rome Metropolitan Area entered the Coosa, Etowah and Oostanaula Rivers. The estimated raw domestic sewage loading was 40,000 P.E.

The Rome Kraft Company plant, located some 15 miles downstream from Rome, produces approximately 1,300 tons per day of container board from soft and hard woods by the Kraft sulfate process. Sanitary sewage, water treatment sludges, and the waste from ash sluicing are discharged directly to the Coosa River. Overflow from the chip preparation area and waste water from the dry end of the paper machines are discharged to a decanting pond, and the pond effluent is discharged to the river. All other process wastes are treated in a trickling filter and lagoon waste treatment system before discharge to the Coosa River.

During August 1962, the average pollutional strength of this treated waste amounted to 243,000 P.E. This treated waste was the major source of organic pollutional loading to the Coosa River in the study area. The suspended solids loading approximated 15 tons per day. B.O.D. loading and river quality data provided by the Rome Kraft Company are shown in Table No. A-2.

RIVER WATER QUALITY AND DAMAGE TO WATER USE

RIVER WATER QUALITY

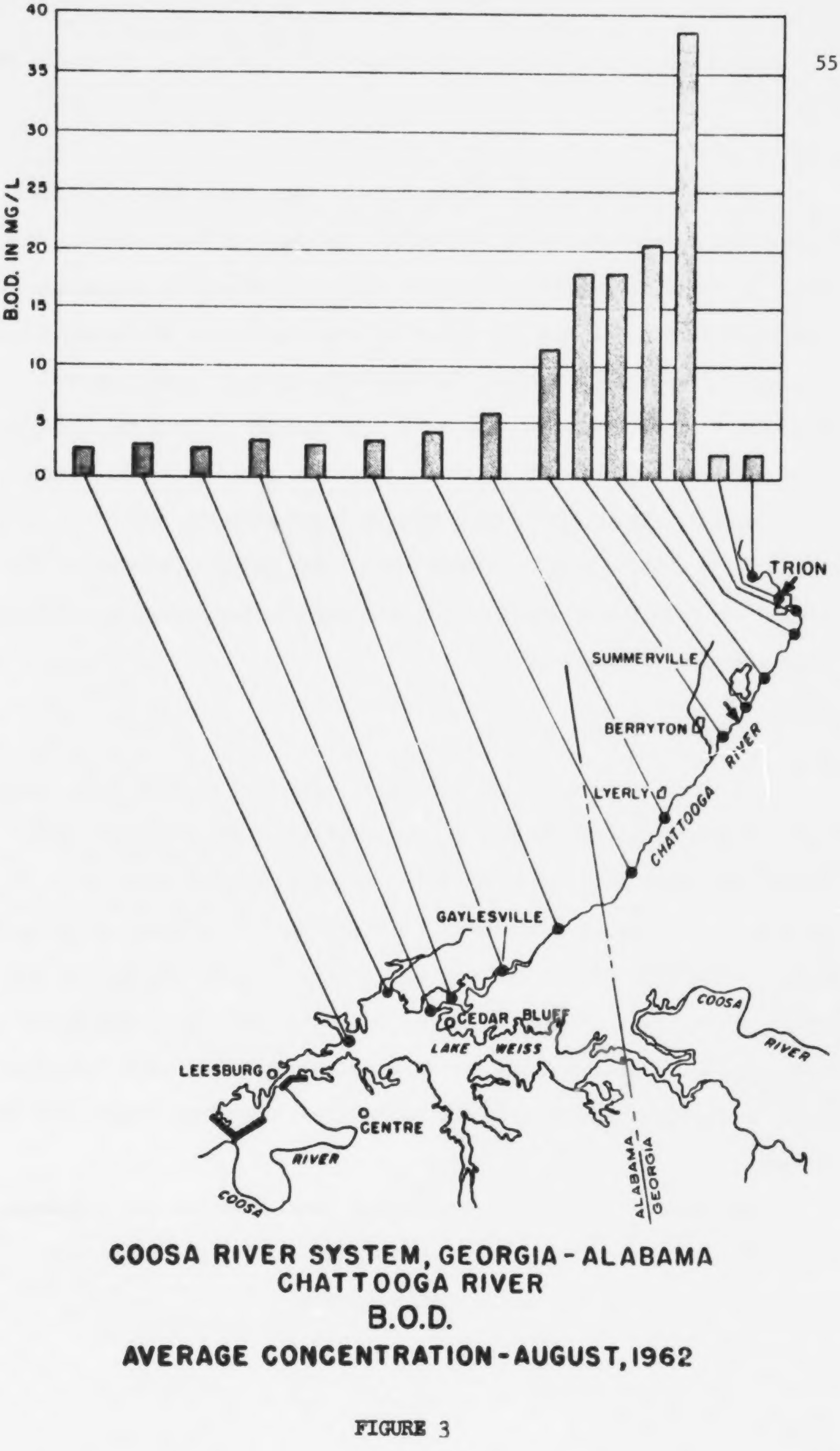
Chattooga River

5-Day Biochemical Oxygen Demand (B.O.D.)

The 5-day biochemical oxygen demand, or B.O.D., is a measure of dissolved oxygen that is used by unstable organic matter in water.

The B.O.D. of the Chattooga River waters from above Trion, Georgia, and down into Lake Weiss in the State of Alabama is shown on Figure 3. A summary of the field data, including maximum, minimum, and average B.O.D. values at each sampling station is posted in Tables A-3 and A-4.

In Trion, Georgia, (CH-45.85) above the sewage outfall and about one-tenth of a mile above the Riegel Textile plant waste outfall, the B.O.D. averaged 2.2 mg/l. About 1 mile below Trion (CH-44.65) the average B.O.D. increased to 38.6 and ranged from 30 to 49 mg/l. As shown in the accompanying dissolved oxygen summaries, the large pollutional load, primarily from the Riegel Textile plant, greatly exceeded the pollution assimilation capacity of the Chattooga River and seriously depleted the dissolved oxygen for 21 miles downstream.



COOSA RIVER SYSTEM, GEORGIA - ALABAMA
CHATTOOGA RIVER
B.O.D.
AVERAGE CONCENTRATION - AUGUST, 1962

FIGURE 3

About 1 mile above the Summerville outfall sewer (CH-37.8) the average B.O.D. was reduced to 17.8 mg/l. In the next 3-mile reach, the amount of residual upstream pollution removed by natural purification forces apparently exceeded the amount of fresh pollution discharged from the Summerville outfall sewer. At River Mile CH-34.8, some 2 miles below the Summerville sewer, the B.O.D. was further reduced to 11.6 mg/l. No significant amounts of pollution entered the river below the Summerville outfall. The B.O.D.'s then dropped systematically from 5.8 mg/l at Lyerly to about 2.5 mg/l in Lake Weiss. The damaging effects of the excessively high B.O.D. loadings are discussed in the following dissolved oxygen section of this report.

Dissolved Oxygen (D.O.)

In order to support fish and other beneficial aquatic life, streams must contain dissolved oxygen. It is generally agreed that most game fishes, including bass and bluegills, require at least 4 to 5 mg/l. If the D.O. is suppressed significantly below 4 mg/l the aquatic environment becomes unsuitable for the propagation of many species. At various D.O. levels below 3 mg/l, fish will leave the oxygen deficient areas or die. Obviously, all fishes and most other normal aquatic life will be killed where decomposing organic pollution removes all dissolved oxygen from the stream.

The Alabama State Water Improvement Commission has set a minimum dissolved oxygen requirement of 4 mg/l to protect the fisheries and recreation values of the waters within the State.

The dissolved oxygen content of the Chattooga River is summarized in Table No. 2 and illustrated on Figure 4.

Above Trion (CH-45.85) the Chattooga River waters were almost completely saturated with dissolved oxygen. The D.O. ranged from 8.2 to 9.4 for an average of 8.6 mg/l.

Industrial wastes from the Riegel Textile Corporation in Trion, discharged to the Chattooga River at River Mile CHR-45.75, drastically reduced the dissolved oxygen resources of the Chattooga River. Three miles below this waste discharge, (CH-42.4) the average dissolved oxygen concentration dropped to 2.4 mg/l, and 93 per cent of all samples collected at this station contained less than 4 mg/l of dissolved oxygen.

Eight miles below this waste discharge and 1 mile above the Summerville outfall sewer, the dissolved oxygen averaged 1 mg/l. At this station (CH-37.8) over half, or 57 per cent of all samples collected were completely devoid of dissolved oxygen. Eighty-five per cent of the samples contained less than 4.0 mg/l. This severe oxygen deficit was caused almost entirely by process wastes from the Riegel Textile Corporation.

Two miles below the Summerville outfall sewer (CH-34.8) the dissolved oxygen concentration increased slightly to 1.3 mg/l, but 57 per cent of the samples were completely devoid of dissolved oxygen and 85 per cent contained less than 4.0 mg/l. The only samples showing significant quantities of dissolved oxygen were collected on Sunday or early on Monday mornings before the normal weekday industrial waste discharges from the Trion area reached this section of the stream.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

DISSOLVED OXYGEN SUMMARY TABLE NO. 2

CHATTOOGA RIVER

STATION NO.	RIVER MILE	NO. OF SAMPLES	SURVEYS INCLUDED	D.O. (mg/1)			% Below 4.0 mg/1	% of 0.0 mg/1
				MAX.	MIN.	AVG.		
CH-9	CH-48.85	14	G	8.3	5.3	6.6	0	0
CH-8 B	CH-45.85	9	G	9.4	8.2	8.6	0	0
CH-8 A	CH-44.65	4	G	6.7	4.0	4.9	0	0
CH-8	CH-42.4	14	G	5.2	1.5	2.4	93%	0
CH-7	CH-39.6	14	G	5.9	0.0	1.1	85%	21%
CH-6	CH-37.8	14	G	6.0	0.0	1.0	85%	57%
CH-5	CH-34.8	14	G	6.7	0.0	1.3	85%	57%
CH-4	CH-28.8	14	G	6.3	0.7	3.2	57%	0
CH-3/1-C	CH-23.6	34	G + A	7.8	1.7	3.9	56%	0
CH-2/2-CH	CH-18.4	34	G + A	8.2	3.1	4.6	29%	0
CH-1/3-CH	CH-12.4	34	G + A	9.1	2.1	4.5	56%	0
4-CH	CH- 8.9	20	A	9.5	2.3	7.0	5%	0
5-CH	CH- 5.5	15	A	9.9	5.7	7.3	0	0
1-LR	-	15	A	10.0	6.4	7.9	0	0
10-C	C-231.0	15	A	9.7	5.6	7.6	0	0

G = PHS GENERAL SURVEY

A = ALABAMA SURVEY

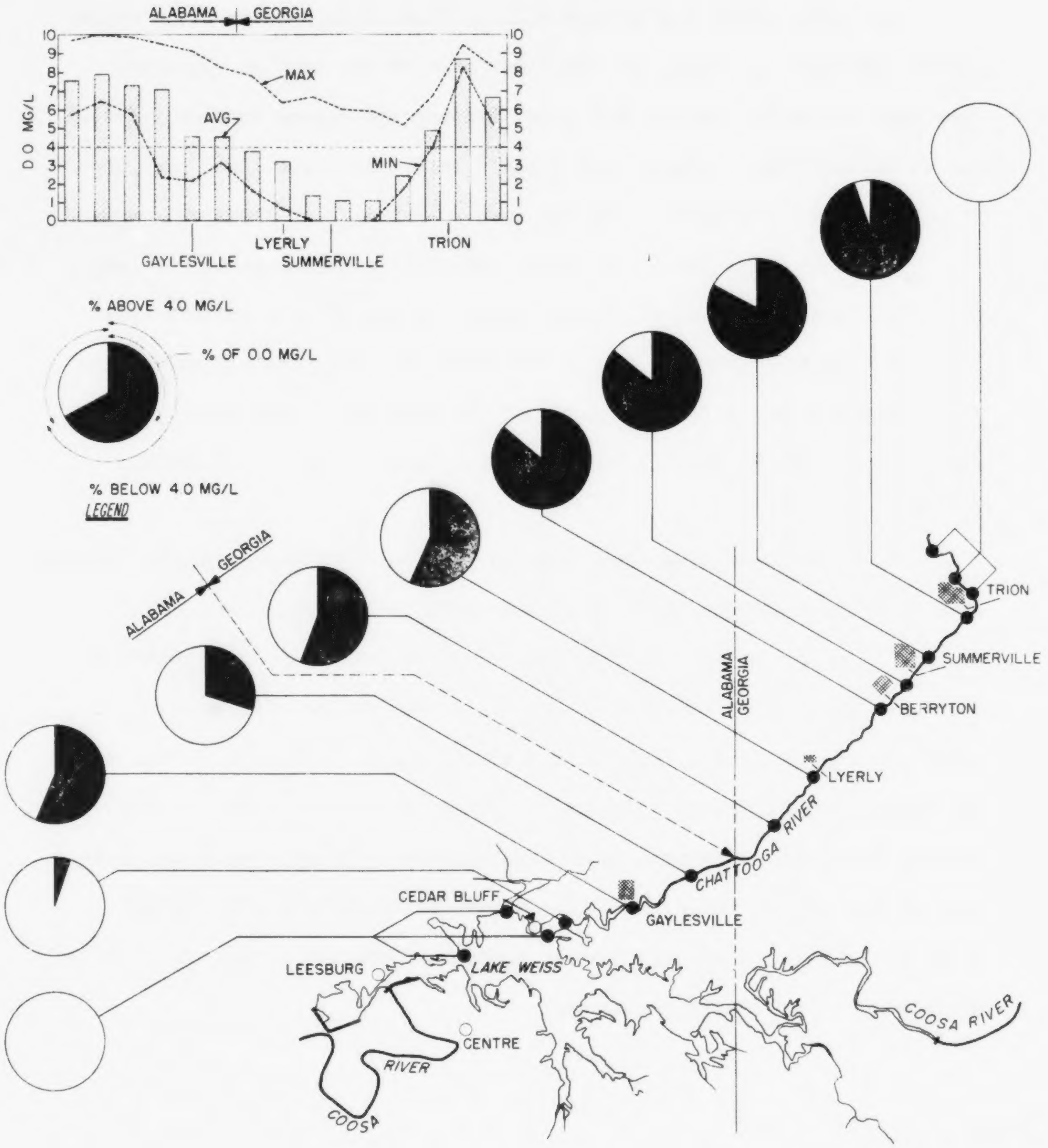
COOSA RIVER SYSTEM, GEORGIA - ALABAMA

CHATTOOGA RIVER

DISSOLVED OXYGEN

PERCENT OF SAMPLES BELOW 4.0 MG/L - AUGUST 1962

FIGURE 4



Downstream from Lyerly the stream began to recover but remained in critical condition at the state line.

Two miles above the Georgia-Alabama State Line the dissolved oxygen content averaged 3.8 mg/l, but more than half of the samples contained less than 4.0 mg/l. Beyond this point the average oxygen content improved, but at Gaylesville, Alabama, some 9 miles below the state line, more than 50 per cent of the samples contained less than 4 mg/l of dissolved oxygen.

About 15 miles below the state line, in the Chattooga arm of Lake Weiss, the average dissolved oxygen content increased to a satisfactory level of 7 mg/l, although 1 sample contained less than the 4.0 mg/l minimum. Farther down in Lake Weiss proper the averages ranged from 7 to almost 8 mg/l and no samples contained less than 5.6 mg/l of dissolved oxygen.

The dissolved oxygen data and the previously discussed B.O.D. results show that the Chattooga River is grossly polluted by sewage and industrial wastes. The most severe effects occurred in the vicinity of Summerville, Georgia. The decomposing organic materials reduced the dissolved oxygen below the survival level for fish and aquatic life. Although stream recovery started around Lyerly, Georgia, the quality of the interstate waters passing the Georgia-Alabama State Line remained critical. More than one-half of the samples collected 1 mile above the state line and 9 miles below the state line at Gaylesville, Alabama, contained less than the 4 mg/l minimum dissolved oxygen requirement.

Hydrogen Ion Concentration (pH)

The hydrogen ion concentration, or pH, indicates the degree of acidity or alkalinity of the waters. Fish and other aquatic life can tolerate moderately acid and alkaline waters in the pH range from about 5.4 to 8.5. The range and average pH of the Chattooga River waters are posted on Tables A-3 and A-4.

The pH of the river entering Trion, Georgia, averaged 7.2. Alkaline wastes from the Riegel Textile plant increased the average pH to 9.7 at the Highway No. 27 bridge 1 mile below Trion. The pH averaged 9.0 at the first station below Summerville and 8.0 in Lake Weiss.

The alkaline wastes increased the pH of the river between Trion and the Summerville area to levels that can destroy or seriously inhibit aquatic life. The pH values of waters flowing across the state line and through Lake Weiss were satisfactory.

Color and Physical Appearance

The color of the Chattooga River, determined according to Standard Methods for the Examination of Water and Sewage, is also shown in Table A-3.

Chattooga River water entering the Trion area contained 11 color units. One mile below the Riegel Textile Mill waste discharge the color intensity rose to 57 color units. Three miles below Trion the color averaged 33 color units and remained at approximately this level down to the first station above Summerville. From this point on downstream the average color intensity decreased at a substantially uniform rate to 19 color units just above the state line and between 16 and 15 units at the last 2 stations in Alabama below the state line.

When river waters are polluted by dyes or similar wastes containing a variety of unnatural hues and colors, visual observations of the stream proper can be more informative and provide a more realistic picture of the actual stream appearance than routine comparison with the laboratory color intensity standards. The color of the Chattooga River water below Trion changed from day to day according to the type, volume and intensity of dye stuffs included in the textile mill waste discharge. At times the river was deep blue, almost black. At other times it presented a dirty gray appearance, and on 1 occasion the river turned brilliant green. The colors faded perceptively in the downstream reaches from below Summerville to the state line. A variety of colors, mostly grays and greens, but much less intense than those observed upstream, were at times present near the state line. At the Highway 35 bridge at Gaylesville, Alabama, the waters were generally much greener than above the state line. The green color at this station, however, was caused by algae growths in this embayment of Lake Weiss.

In summary, pollution by textile mill wastes has degraded the appearance of the Chattooga River and has made many sections of the stream unattractive for scenic or recreational use.

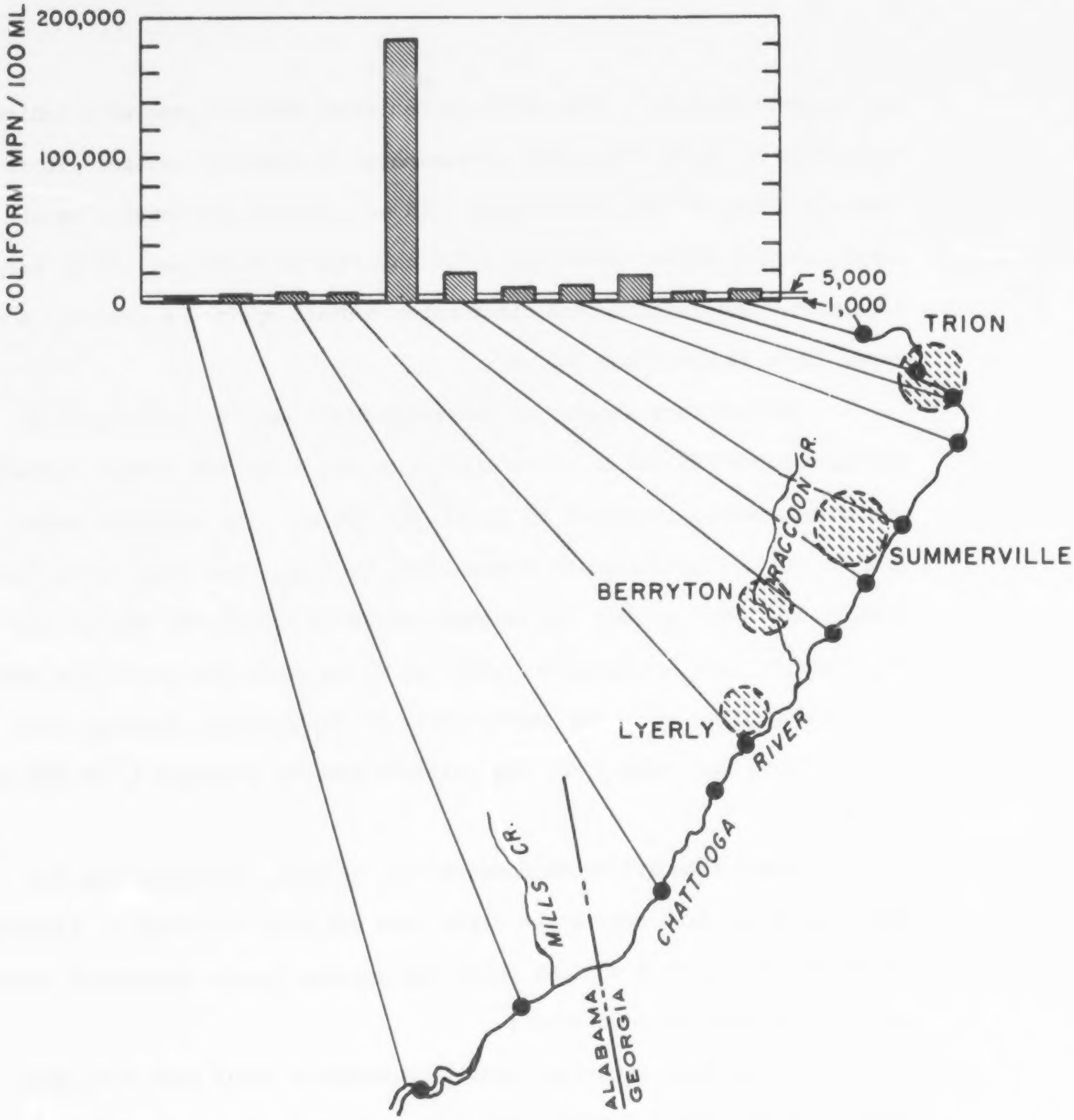
Coliform Bacterial Density (MPN/100 ml)

The most probable numbers of coliform bacteria per 100 ml of sample, found at the Chattooga River sampling stations are posted in Table No. A-3 and shown on Figure 5. The coliform bacterial density generally indicates the extent to which waters are contaminated by domestic sewage. It is commonly accepted that river water used as a source of domestic water supply should contain less than 5,000 coliform bacteria per 100 ml before treatment. For swimming and other water contact sports, a commonly accepted upper limit is 1,000 per 100 ml.

The coliform density of Chattooga River waters entering Trion averaged 5,000 MPN/100 ml. One mile below the Trion raw sewage discharge, the concentration increased to 19,000 per 100 ml. The averages ranged from 9,000 to 20,000 down to Summerville, Georgia. Two miles below the Summerville sewer outfall the average increased to 185,000 MPN/100 ml. The averages then decreased to 7,400 two miles above the state line and 6,000 three miles below the state line. At Gaylesville, Alabama, some 9 miles below the state line, the coliform density averaged 1,800 MPN per 100 ml.

Sewage from Trion and Summerville, Georgia, contaminating the Chattooga River down across the state line and into the State of Alabama, increased the coliform content above the maximum levels considered satisfactory for water contact sports.

The coliform bacterial densities probably would have been much greater if the Riegel Textile wastes had not exerted a toxic effect. The bacterial growth-inhibiting effect of Riegel Textile wastes is shown in the following tabulation of special toxicity tests run during the August survey.



COOSA RIVER SYSTEM, GEORGIA - ALABAMA
CHATTOOGA RIVER
COLIFORM BACTERIA
MPN / 100 ML - AUGUST 1962
FIGURE 5

River Mile CH-45.85	Moderately growth inhibiting.
Riegel Wastes	Very growth inhibiting.
River Mile CH-42.4	Growth inhibiting.
River Mile CH-34.8	Growth inhibiting.
River Mile CH-18.4	Moderately growth inhibiting.

Calculations based on average coliform MPN for raw domestic sewage indicate that raw sewage from a 3,000 population community discharged into a stream flowing at approximately 100 cfs, would normally increase the coliform content of the stream to about 500,000 per 100 ml. Thus, the coliform content would normally be expected to approach 500,000 per 100 ml below Trion if the growth-inhibiting substances were not discharged to the stream. Below the Summerville sanitary sewer, the additional coliform load would raise the total MPN significantly above this 500,000 level. Assuming normal decrease due to natural purification, the residual coliform density would probably be 100,000 or more in the vicinity of the state line. These calculations reveal that the potential danger from the Trion and Summerville raw sewage contamination is much greater than indicated by the measured coliform densities. Provision of adequate municipal sewage treatment facilities is the proper method for controlling public health hazards of this type.

The reduction of coliform bacteria by the Riegel Textile wastes was, in itself, beneficial. Unfortunately, the toxic effects of these wastes were not specifically limited to the destruction of coliform and associated harmful bacteria. These wastes also killed desirable aquatic species and posed a constant threat to fish life in the Chattooga River.

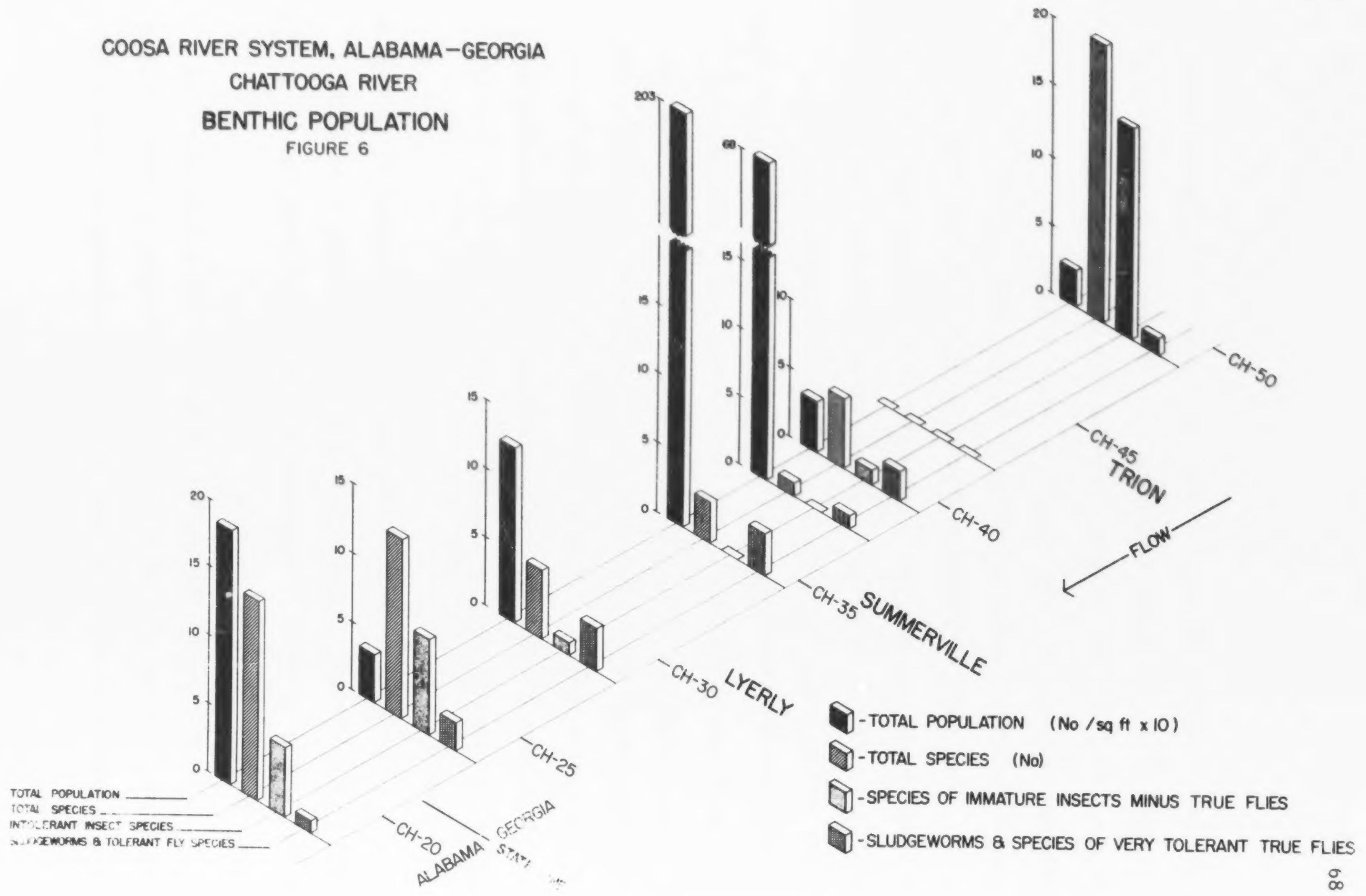
Biological Studies

Clean waters support a wide variety of benthos or bottom dwelling organisms which are exacting in their habitat requirements. Their production may be controlled by several aquatic factors, including dissolved salts, the speed of the current, water temperature, dissolved oxygen, the physical nature of the stream bed, and the frequency and magnitude of flooding. Physical stream conditions, such as changed in stream bottom caused by the deposition of silt or sludge and other particulate matter over the rubble affect quantitative and qualitative distribution of the benthos. The diversity of biota normally decreases as the stream bed changes from rubble through gravel, gravel and sand, and muck and pure sand, as the number and variety of utilizable living spaces decrease. For example, the relative productivity of a rubble bottom may be 50 times greater than pure sand. Thus, the type of substrate is an important factor in the development of a benthic society.

Bottom dwelling organisms are directly subjected to any substance which may enter the environment. Typically excessive organic wastes will produce drastic changes within the benthic community. If organic pollution becomes severe there is an immediate reduction in both the species and the total population of organisms. A short distance downstream the number of species remains low because only tolerant forms can withstand conditions within the bottom substrate, and the total population increases because of a rich and constant food supply (i.e. organic wastes) and a marked decrease in predation within the biotic community.

COOSA RIVER SYSTEM, ALABAMA—GEORGIA
CHATTOOGA RIVER
BENTHIC POPULATION

FIGURE 6



and very tolerant biota predominated. A tolerant green alga was noted adhering to the bottom deposits. Two miles farther downstream the green alga was still evident; filamentous blue-green algae and diatoms were attached to the rocks. The sludgeworm population, the only benthic organisms encountered, reached a density of 680 per square foot.

The series of observations at River Mile 34.8, some 2 miles below Summerville, shows the total effect of the residual wastes from the Trion area and the fresh raw sewage and industrial wastes from the Summerville outfall sewer. As shown on Figure 6, the total bottom organism population increased to more than 2,000 per square foot. Only those organisms which can survive in polluted waters were found at this sampling station; sludgeworms predominated. These were found in the 2-inch layer of organic sludge which covered most of the bottom deposits. The absence of clean water species, the manner in which the river bottom was taken over by sludgeworms and other tolerant species, along with the frequent complete absence of dissolved oxygen, shows how grossly this region of the stream was polluted.

Below Lyerly, sludge was not apparent, but the majority of organisms were sludgeworms and tolerant midge larvae. A reduction in population numbers and an increase in numbers of species at this point, however, indicated the start of stream recovery.

Two miles above the Georgia-Alabama line and 3 miles below the state line, a normal population of benthic forms was encountered. Immature insects associated with clean water were not as prevalent as above Trion, but did make up approximately half of the total species encountered at the respective stations.

Etowah, Oostanaula and Coosa Rivers

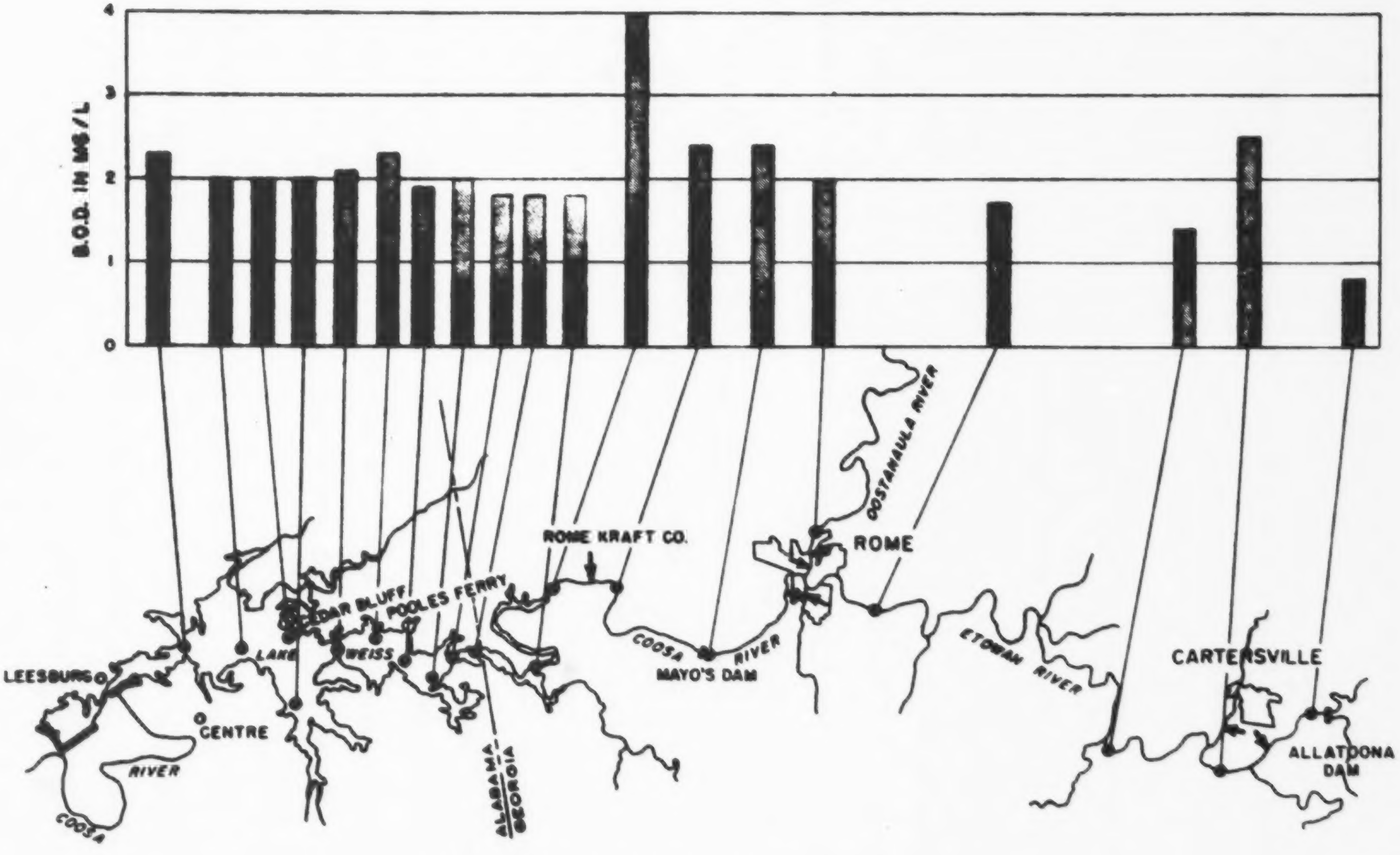
5-Day Biochemical Oxygen Demand (B.O.D.)

A summary of the August general survey data, including B.O.D. is posted on Tables No. A-5, A-6, and A-7. Figure No. 7 shows the average B.O.D.'s from Cartersville to Lake Weiss. The B.O.D.'s collected during the special round-the-clock survey were used to develop the Etowah River section of Figure 7.

Waters discharged through Allatoona Dam contained 0.8 mg/l of B.O.D. At Station E-39.0, below the Cartersville Etowah River sewer outfall but above Pettit Creek, the average B.O.D. increased to 2.5 mg/l. At Station E-30.4, some 7 miles below Pettit Creek, the B.O.D. was reduced to 1.4. At River Mile E-6.4 near the mouth of the Etowah, the B.O.D. averaged 1.7 mg/l.

Immediately above Rome at River Mile O-1.3, the Oostanaula River water B.O.D. averaged 2.0 mg/l. The calculated average B.O.D. of the combined Etowah and Oostanaula River waters at the confluence was approximately 1.8 mg/l.

The average B.O.D. of the Coosa increased to 2.4 mg/l below Rome. The average B.O.D. remained at this 2.4 mg/l level down to Station C-268.5, approximately 15 miles below Rome and 1 mile above the Rome Kraft industrial waste outfall diffuser.



COOSA RIVER SYSTEM, GEORGIA-ALABAMA
ETOWAH, OOSTANAULA AND COOSA RIVERS
B.O.D.
AVERAGE CONCENTRATION-AUGUST, 1962

FIGURE 7

Two miles below the industrial waste diffuser the B.O.D. increased to 4.0 mg/l. Nine miles downstream the residual B.O.D. was reduced to 1.8 mg/l, and remained at this level as it crossed the Georgia-Alabama State Line. Except for 2 stations where the B.O.D. averaged 2.3 mg/l, the B.O.D. remained at a fairly constant level of 2.0 mg/l throughout Lake Weiss.

Figure 7 shows that the principal organic waste load contributing to interstate pollution enters the Coosa River from the Rome Kraft Company paper mill. Otherwise, there are no significant variations in the overall B.O.D. picture.

Dissolved Oxygen (D.O.)

1962 Studies

The dissolved oxygen characteristics of the Etowah, Oostanaula, and Coosa Rivers are posted in Tables No. A-5, A-6, and A-7. Special dissolved oxygen summaries are shown in Table No. 3 and illustrated on Figure No. 8. The bar graph at the top of Figure 8 shows the average, maximum and minimum D.O. and the shaded circles indicate the per cent of samples containing less than the 4.0 mg/l.

Etowah River water is withdrawn from the depths of the Allatoona impoundment where there is little or no dissolved oxygen during a portion of the year. For about 5 to 10 miles below the dam the low dissolved oxygen concentrations, and the pollution discharges discussed elsewhere, made the river unsuitable for the propagation of fish and other normal aquatic life.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

DISSOLVED OXYGEN SUMMARY

TABLE NO. 3

Etowah, Oostanaula and Coosa Rivers - August 1962

STATION NO.	RIVER MILE	NO. OF SAMPLES	SURVEYS INCLUDED	D.O. (mg/1) MAX.	MIN.	AVG.	% Below 4.0 mg/1
E-8	E-47.3	4	G	2.0	1.6	1.8	100%
E-7	E-44.5	3	G	3.4	2.3	2.8	100%
E-6	E-39.0	16	S	7.5	2.3	4.7	25%
E-5	E-30.4	20	S	7.6	5.5	6.4	0
E-3	E-21.4	16	S	8.6	6.4	7.4	0
E-2	E- 6.4	23	S	8.5	6.7	7.6	0
O-1	O- 1.3	24	S + G	7.4	5.6	6.5	0
C-2	C-275.4	37	S + G	8.5	6.0	6.9	0
C-3	C-268.5	35	S + G	7.4	6.0	6.6	0
C-4	C-265.3	35	S + G	6.8	4.4	5.8	0
C-6	C-256.0	52	S + G	6.6	1.8	3.8	46%
C-7/1-C	C-252.8	72	S + G + A	10.2	1.9	4.3	37%
2-C	C-251.3	20	A	6.0	1.9	4.3	50%
3-C	C-249.6	20	A	8.9	2.6	4.7	40%
C-8/4-C	C-247.9	33	G + A	9.5	3.0	4.6	51%
5-C	C-246.4	20	A	10.1	3.5	5.8	15%
6-C	C-243.6	20	A	8.4	2.8	6.0	10%
7-C	C-240.1	20	A	8.1	3.3	6.0	5%
8-C	C-236.1	20	A	9.4	5.0	7.1	0
9-C	C-234.0	20	A	9.8	4.7	6.9	0
10-C	C-231.0	15	A	9.7	5.6	7.6	0

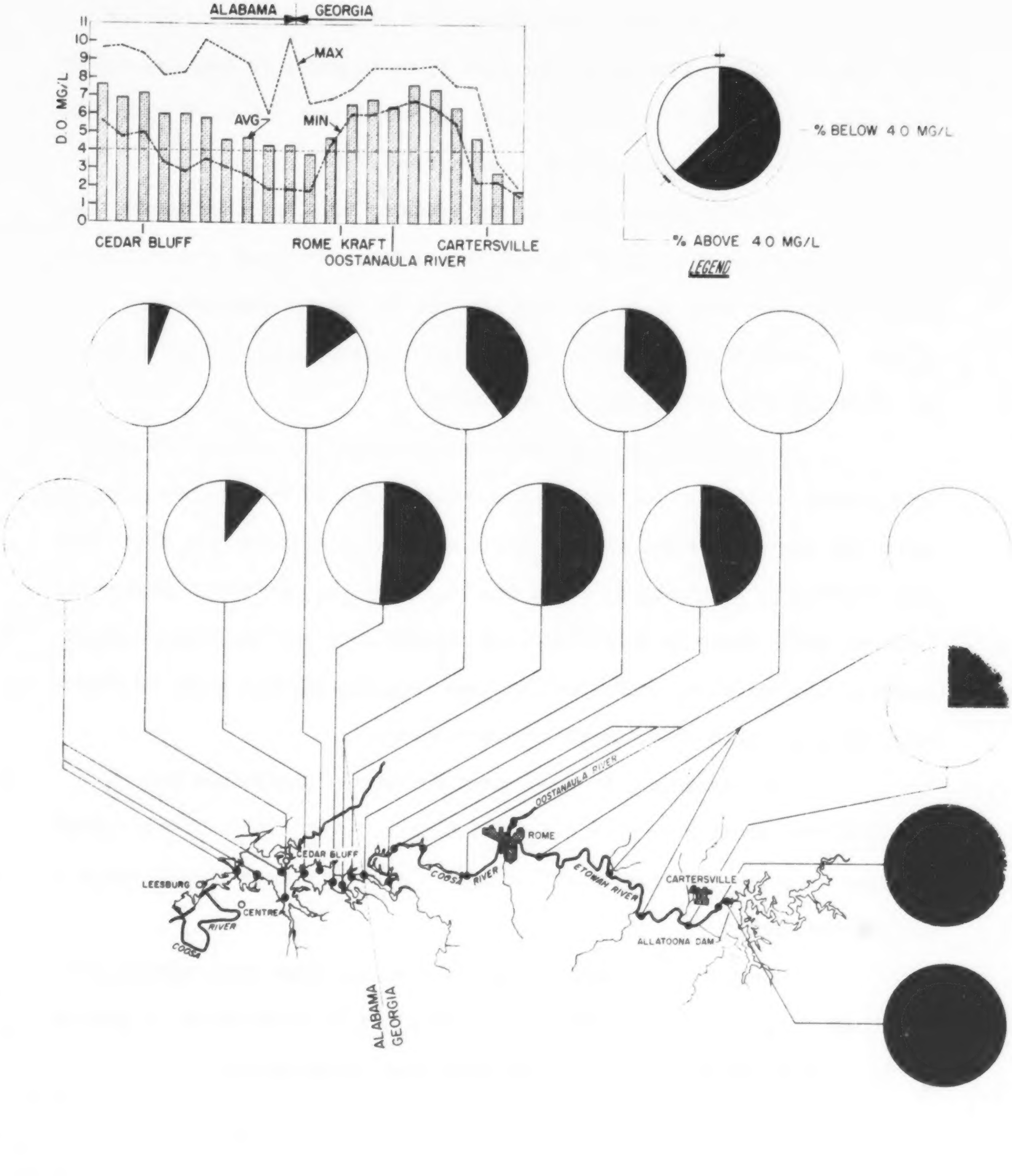
G = PHS GENERAL SURVEY

S = PHS SPECIAL SURVEY

A = ALABAMA SURVEY

COOSA RIVER SYSTEM, GEORGIA — ALABAMA
ETOWAH, OOSTANAULA AND COOSA RIVERS
DISSOLVED OXYGEN
PERCENT OF SAMPLES BELOW 4.0 MG/L — AUGUST 1962

FIGURE 8



For a distance of 3-1/2 miles below the dam the D.O. remained consistently below 4.0 mg/l as it ranged from 1.6 to 3.4 mg/l. At Station E-39.0, some 9 miles below the dam, natural reaeration had increased the average D.O. to 4.7 mg/l, but 25 per cent of the samples contained less than 4.0 mg/l. Throughout the next 35 to 40 miles to Rome the river contained adequate D.O. as the averages increased from 6.4 to 7.6 and the D.O. ranged from a minimum of 5.5 to a maximum of 8.6 mg/l.

Conditions observed in the vicinity of Allatoona Dam are similar to those which frequently prevail at multipurpose flood protection and power production dams where the water levels in the impoundments are raised and lowered according to storage requirements, and turbine intakes are normally located deep in the reservoir.

A number of methods have been proposed to resolve the problems caused by low D.O. at the turbine intakes and to improve water quality below the dams. In a few special cases, for example, submerged weirs have been constructed upstream from the dam to direct the water from nearer the surface, where there is more dissolved oxygen, into the low level turbine intakes. In practice, each specific case requires special study to determine the most appropriate corrective procedure.

The average D.O. concentrations of the Oostanaula and the Etowah Rivers above Rome were 6.5 and 7.6 mg/l respectively. These rivers combined to provide a calculated 7.2 mg/l dissolved oxygen concentration at the confluence.

Sewage and industrial wastes from the Rome area lowered the dissolved oxygen moderately throughout the first 14 river miles to Station C-268.5, which is about 1 mile above Rome Kraft Corporation.

Here the dissolved oxygen ranged from 6.0 to 7.4 for an average of 6.6 mg/l. At Station C-265.3, 2 miles below Rome Kraft, the D.O. remained above 4.0. Downstream from this point and past the Georgia-Alabama State Line, the oxygen demand of the paper mill wastes and the residual organic loading from Rome exceeded the oxygen resources and reaeration capacity of the river. The shaded circles on Figure 8 show that the D.O. fell below 4.0 mg/l frequently throughout the 8-mile reach extending from Station C-256.0, 3 miles above the state line to Station C-247.9, at Poole's Ferry, 5 miles below the state line. In this reach almost half of all samples contained less than the minimum D.O. requirement of 4.0 mg/l. Furthermore, the extreme lows at 3 of these stations above, at, and below the state line dropped to the dangerous levels of 1.8 and 1.9 mg/l.

Below this point the rate of recovery exceeded the residual oxygen demand. The minimum dissolved oxygen requirement was violated 15 per cent of the time at Station C-246.4, 10 per cent of the time at Station C-243.6, and 5 per cent of the time at Station C-240.1, some 13 river channel miles below the state line.

Throughout the rest of Lake Weiss the dissolved oxygen recovered to slightly more than 7 mg/l and remained consistently above 5 mg/l.

Comparison With Previous Surveys

During 1954 the Alabama Water Improvement Commission obtained base line data on the stream before wastes were discharged to the Coosa River by the paper mill at Rome. This study, extending from the state line to below Centre, Alabama, was repeated in 1955 and 1957 after the paper mill started operation, but before Lake Weiss was impounded. The D.O. data collected during these 3 surveys are shown on Figure 9. The results of the 1962 surveys were added to illustrate the total trend from 1954 through the current 1962 survey. Average D.O. concentrations, in mg/1, are shown in the upper family of curves. The minimum D.O. observed at each station during these surveys is shown on the lower chart.

In 1954 the D.O. content of the river was excellent and never fell below 7 mg/1.

The 1955 and 1957 curves show the effects of the paper mill wastes before the power dam was constructed. The D.O. concentration was progressively reduced during this 3-year span. In the vicinity of Cedar Bluff, Alabama, for example, the 1955 D.O.'s were about 1-1/2 mg/1 lower than the 1954 values. By 1957 the D.O. had fallen another 1 mg/1. The adverse effects of these wastes were most noticeable in the 5-mile stretch from the state line to Poole's Ferry, where the minimum D.O. for both surveys dropped below the prescribed 4.0 mg/1 requirement. Although the averages were slightly above 4.0, the minimums were in the range of 3.6 mg/1.

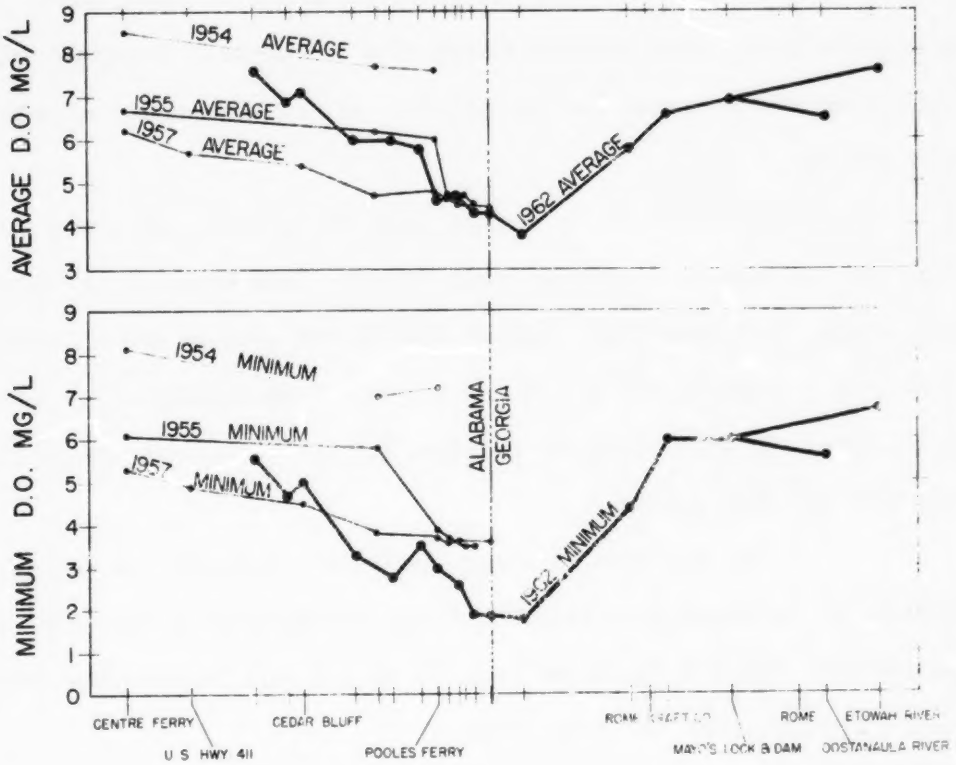
Lake Weiss, extending from the new Alabama Power Company's dam near Centre, Alabama, across the state line to Mayo's Lock and Dam, some 7 miles below Rome, Georgia, was filled in 1961. The heavy lines of Figure 9 show the August 1962 D.O. concentrations.

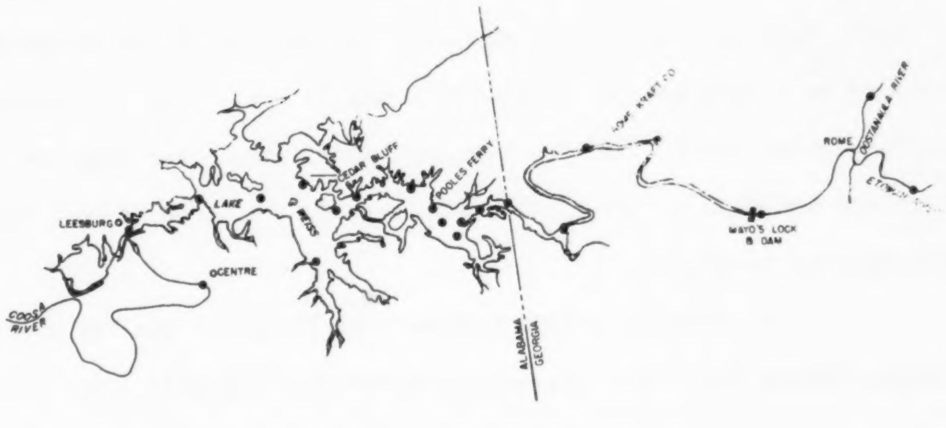
COOSA RIVER SYSTEM, ALABAMA - GEORGIA
COOSA RIVER & LAKE WEISS

DISSOLVED OXYGEN

COMPARISON WITH PREVIOUS SURVEYS

FIGURE 9




COOSA RIVER
LEESBURG
CENTRE
LAKE
WEISS
CEDAR BLUFF
POOLES FERRY
ALABAMA
GEORGIA
ROME KRAFT CO
MAYO'S LOCK & DAM
ROME
OOSTANAULA RIVER
ETOWAH RIVER

Three major events occurred since the 1957 survey. Paper mill waste treatment facilities were constructed and placed in operation. Paper mill production was about doubled during August 1962, and the treated effluent load exceeded the previous untreated waste load. The Lake Weiss impoundment reduced stream flow velocities, increased depths, eliminated riffle areas, and reduced the rate of reaeration below Mayo's Lock and Dam.

Portions of the August 1962 curves above the state line show how the organic pollution loads from the Rome area and the paper mill wastes from Rome Kraft Company reduced the average and minimum dissolved concentrations to 3.8 and 1.8 mg/l respectively. For a few miles below the state line the averages did not change materially from the 1955 and 1957 values.

The minimums, however, definitely revealed the damaging effects of increased pollutional loadings accompanied by decreased stream reaeration. The D.O.'s ranged from 1.8 to 1.9 mg/l between the stations just above and below the state line.

D.O. began to recover at about Poole's Ferry and continued to improve down to Cedar Bluff, Alabama. At Cedar Bluff the minimums increased to 5 mg/l and the average D.O. was slightly over 7. Downstream from this point the D.O. of the impounded water was higher than the river water D.O. had been in 1957, and the average D.O.'s exceeded both the 1955 and 1957 levels.

In Summary, Figure 9 shows that the water quality at the Georgia-Alabama State Line has been progressively degraded since 1954.

Increased waste loadings and reduced stream reaeration rates in the reach above the state line reduced the minimum D.O. concentrations to the dangerously low level of 1.8 mg/l. Natural purification in Lake Weiss proper increased the oxygen content and, under August 1962 loading conditions, restored it to satisfactory levels at and beyond Cedar Bluff, Alabama. Although the average D.O. of all samples collected at the state line was about 4 mg/l, almost 50 per cent of the samples collected throughout a 15-mile reach in this area contained less than this minimum requirement.

Sewage and industrial waste pollution from the Rome area and the Rome Kraft plant, has frequently reduced the Coosa River and upper Lake Weiss dissolved oxygen content below levels considered suitable for fish propagation.

Conditions were critical during August 1962. If the declining dissolved oxygen trend continues, extensive fish and aquatic life habitats above and below the state line will be destroyed.

Hydrogen Ion Concentration (pH)

pH levels in the Etowah, Oostanaula, and Coosa Rivers and Lake Weiss were satisfactory.

The pH of the Etowah River ranged from 6.4 at Allatoona Dam to 7.2 at the mouth in Rome, Georgia. A value of 7.3 prevailed in the Oostanaula River.

The pH of the Coosa River from Rome, Georgia, down across the state line and to Poole's Ferry in Alabama was about 7.0. In Lake Weiss proper, the pH increased slightly to range from 7.0 to 8.0.

Color

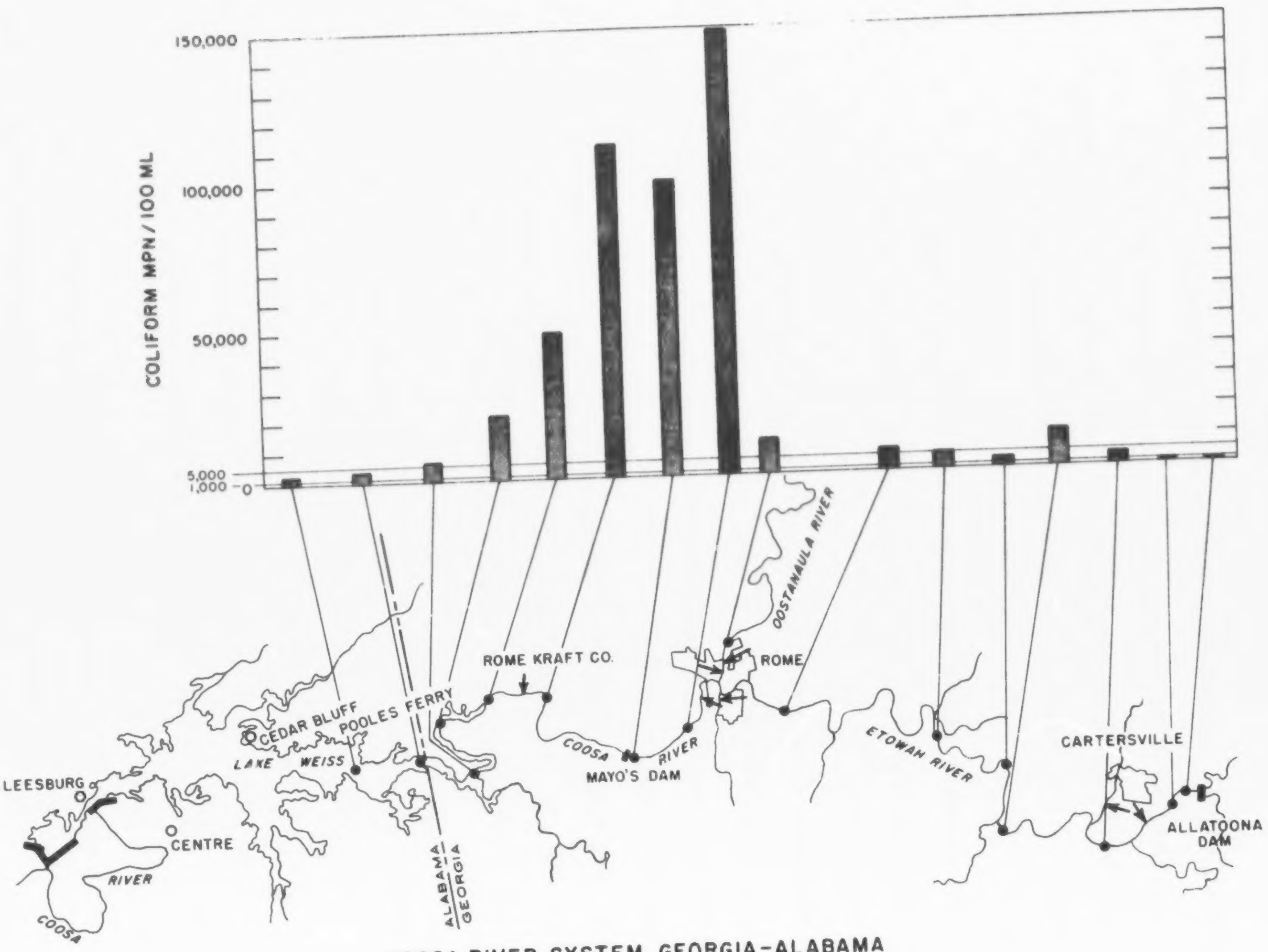
The color intensities of these waters, as determined by Standard Methods, are posted in Tables No. A-5 and A-6. In the standard color test, the water sample is centrifuged to remove suspended material before the solids-free liquor is compared with color standards. This test measures the intensity of dissolved color but does not generally show the influence of suspended silt or turbidity on the over-all appearance of the waters.

Water at the first station below Allatoona Dam contained 25 color units. An average of 15 color units was observed at the next station just above Cartersville. Downstream in the Etowah River and in the upper 14 miles of the Coosa River below Rome the color, ranging from 17 to 24 units, did not change significantly. The color increased to 35 units just below the Rome Kraft waste outfall. From this point down across the state line to Poole's Ferry in Alabama, the average color remained fairly uniform in range from 30 to 35 color units.

The apparent color and general appearance of these waters vary with the suspended sediment loads which are discussed in a subsequent section on Silt.

Coliform Bacterial Density (MPN per 100 ml)

The average coliform bacterial densities, expressed in MPN per 100 ml, are posted in the Summary Tables No. A-5 and A-6, and shown on Figure 10. Above Cartersville, the Etowah River waters released from Allatoona Dam contained approximately 1,000 coliform bacteria per 100 ml.



COOSA RIVER SYSTEM, GEORGIA-ALABAMA
ETOWAH, OOSTANAULA AND COOSA RIVERS
COLIFORM BACTERIA
AVERAGE MPN / 100 ML - AUGUST, 1962
FIGURE 10

At Station E-39.0, approximately 2 miles below Cartersville, the coliform count increased to 4,000. The coliform density of Pettit Creek below Cartersville was 5,000,000 MPN/100 ml. At Station E-30.4, approximately 10 miles below Cartersville, the coliform density averaged 12,500 per 100 ml.

The average coliform densities at the remaining 3 downstream Etowah River stations were approximately 3,000, 6,000, and 7,000 per 100 ml respectively.

Raw domestic sewage pollution entering the river from the Cartersville area increased the coliform bacteria significantly above the 1,000 per 100 ml level commonly accepted as satisfactory for bathing, swimming, and other water contact sports.

The coliform content of the Oostanaula River entering Rome averaged 11,000 per 100 ml. The Silver Creek tributary, containing industrial wastes and treated sewage from Lindale, averaged 124,000 coliforms per 100 ml.

About 1 mile below Rome the coliform content of the Coosa averaged approximately 150,000 per 100 ml. The count dropped slightly to approximately 110,000 at Station C-268.5, some 11 miles downstream. The coliform count continued to decrease to an average of 3,500 at the state line and approximately 2,400 per 100 ml at Poole's Ferry, approximately 5 miles below the state line.

During August 1962, the coliform content of the Oostanaula River above Rome exceeded the levels considered satisfactory for domestic water treatment plant sources. Raw sewage from Rome contaminated the waters of the Coosa River and upper Lake Weiss. The waters from Rome down to at least 5 miles below the state line were unsatisfactory for water contact sports.

Biological Studies

Bottom Organisms

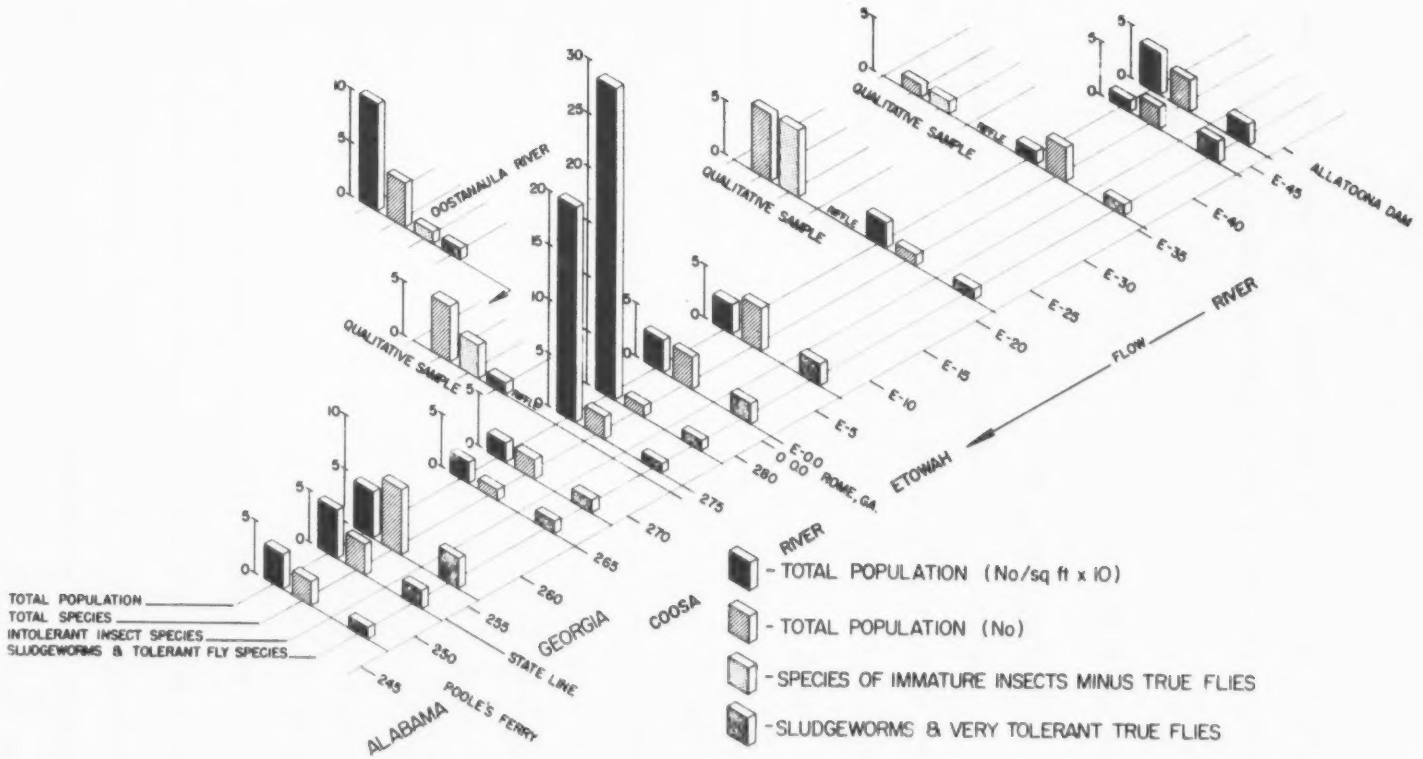
The effect of organic wastes and toxic substances on the benthos, or bottom organisms, was described in the Chattooga River discussion. Additional factors influence the benthic population of the Etowah and Coosa Rivers.

Deposition of silt and other particulate material on the stream bottom affected the quantitative and qualitative distribution of the benthos. The processes of erosion or deposition of mining debris greatly increased the relative proportion of finer materials in the stream bed and reduced the number of usable habitats in which organisms may live. These deposits were principally inorganic in nature and the combined impact of deposition and the abrasive action of the sand carried by strong currents was so great that the potential population response to organic waste was not observed.

The paucity of benthic organisms existing in the Etowah and Coosa Rivers is illustrated in Figure 11. Only a small number of species was found at each of the sampling stations. Furthermore, most of the benthic organisms were tolerant of pollution (sludgeworms, midges, and associated forms).

COOSA RIVER SYSTEM, ALABAMA – GEORGIA
ETOWAH, OOSTANAULA AND COOSA RIVERS
BENTHIC POPULATION

FIGURE 11



The discharge through Allatoona Dam was from a depth in the reservoir which was devoid of dissolved oxygen. As a result, the benthos immediately below the dam consisted of a few very tolerant forms. The water was very clear, however, and pondweeds and eelgrass were found growing in extensive beds along the shore. Green filamentous algae were also found along with Crenothrix and other iron bacteria which deposited a reddish-brown floc over much of the vegetation and portions of the bottom near shore.

A short distance downstream the silty mineral washing wastes discharged by New Riverside Ochre Company created a bottom unsuitable for most benthic forms. The resulting low populations persisted for the remaining length of the Etowah River. At Station E-34, sampling of a rock and riffle area revealed 3 immature mayflies as the only insects bearing visible external gills. Iron bacteria were found at this station but were not found at any point farther downstream in the river system.

Again, in a shallow riffle area near Station E-21.4 just above the Highway 411 bridge, several species of intolerant immature insects were found, including hellgrammites and 1 immature stonefly. The benthic population was extremely low in the riffle, as well as along the banks of the river near shore. At the 2 succeeding stations on the Etowah River, little change was found in those shore line areas. Pondweeds, eelgrass, and other higher aquatic plants were not found below the entrance of the silt from the mineral washing operations.

Samples were collected from the Oostanaula River just above the Rome water intake. Figure 11 shows that although the natural silt deposited along the stream banks did not support a large variety of organisms, the majority of the species were pollution intolerant types, which are normally associated with cleaner waters. Immature burrowing mayflies were noted in numbers approaching 100 organisms per square foot in these areas. Gill-breathing snails were prevalent. Clam shells on the banks indicated that at least 5 genera of unionid clams had lived in the vicinity. It is highly significant that these intolerant forms, normally associated with clear water, were not found in any similar habitats in the Etowah or Coosa Rivers.

The first 2 sampling stations on the Coosa River, approximately 4 and 7 miles below Rome, showed the adverse effects of raw sewage and industrial wastes discharged to the river at Rome. At these stations the sludgeworm population increased to an average of 200 to 300 per square foot; a 6-fold increase over other samples collected from the Etowah River.

One mile downstream organisms were found on rocks in the swift current below Mayo's Dam. Pollution sensitive hellgrammites and immature caddisflies and mayflies occurred, although total population numbers were very low.

From Mayo's Dam downstream, the benthic population along the margins of the Coosa River consisted of low numbers of tolerant forms, such as sludgeworms, midges, nematodes, and an occasional leech.

The importance of bottom organisms to the economy of an aquatic community has been recognized in the past and is currently receiving renewed emphasis. For example, similar studies in other parts of the country have shown marked reduction in organims below the discharge of gravel washing operations. In another stream the production of fish food organisms dropped to almost nil during siltation below a gold dredge operation. One year after the dredge closed operations the silt was flushed from the pools and riffles by freshets and the bottom organisms increased 8 to 10-fold. Other studies have shown that destruction of fish food organisms is frequently a serious limiting factor, and an inadequate food supply is a most common cause of poor fishing quality in lakes and streams alike.

This study demonstrates the impact of the silt and sand deposition upon the biota, both in restricting biotic development to certain pollution tolerant forms and limiting total production within the biotic population. This unfavorable feature of the aquatic environment persists down to and across the state line into Alabama.

Algal Examination

Algae and vegetation are affected by silt principally by (1) covering the bottom material with a layer of sediment, (2) a reduction of light transparency and prevention of light penetration, and (3) a grinding action of the particles. A reduction of plant food is accompanied by a reduction on the poundage of plant-feeding animals that can be supported, and this in turn limits the production of carnivorous animals, including fish. Algae are the foundation of fish food chains. Shad, for example, live on algae and in turn are food for game fishes.

Algal samples were collected from a depth of 2 feet at 3 locations in the Etowah River, 1 point in the Oostanaula River, 4 points in the Coosa River, and 1 point near the center of Lake Weiss (Table A-8, Figure 12).

The water which forms the Etowah River below Allatoona Dam was taken from the depths of Lake Allatoona during summer. At times of turbulent discharge a strong odor of hydrogen sulfide was emitted. A short distance below the dam the water was still very clear and an algal population (Table A-8) had not had an opportunity to develop. Five genera of algae other than diatoms and 9 species of diatoms were found at this station. Over 50 per cent of algal numbers were composed of a blue-green alga, and the diatom population was very low compared to other stations.

Twenty-five miles downstream in a region exposed to the effects of silt turbidity, the algal population was low (126 per ml), and the genera of algae other than diatoms were reduced to 2.

Farther downstream, just above the confluence with the Oostanaula River, the diatom population had increased slightly, but no algae other than diatoms were found, thus showing the adverse effect of silt turbidity on the development of an algal population.

On the Oostanaula River, 1.3 miles above its confluence with the Etowah, the algal population was 10 times more abundant than at any place sampled on the Etowah River. The diatom flora composed over 50 per cent of the algal population while the small coccoid green algae formed the next most abundant group. The population included 10 algal genera excluding diatoms and was composed of all major algal groups.

Two miles below the junction of the Oostanaula River with the turbid waters of the Etowah River, the algal data indicate both a reduction in genera and in numbers to form a population of less than half of that recorded for the Oostanaula River, again demonstrating the adverse effect of silt. Thirteen miles farther downstream there was a further reduction both in kinds and number indicating a die-off of algae from the Oostanaula River when it enters the Coosa River. Only 2 genera of algae other than diatoms were encountered.

Just below the state line, at Station C-252.8, the algal population indicated recovery with a marked increase both in the number of genera and total population. Although the population was not so large as in the Oostanaula River, the relative distribution of the broad groupings was similar. Five miles downstream in the region of Poole's Ferry, algae were collected during a time of moderately strong wind, water mixing and high turbidity. The effect of increased turbulence and mixing upon the algal population was clearly shown in a reduction in types, as well as a marked reduction in numbers per ml. All groups were affected by the adversities of the environment, and the diatoms were reduced to one-fourth of their number at the state line.

A sample collected at a 2-foot depth near the center of Lake Weiss showed a population with more algal cells per ml than any other sample collected in the study. Diatoms composed 85 per cent of the population, but other groups were represented by a number of genera. Protozoa and 6 genera of rotifers were present in a quantity of 56 per L. These latter forms were not present in the river samples.

Incident Light

Incident light is necessary for algae and higher aquatic vegetation to live. Algae are basic in the aquatic food chain. Algae also utilize carbon dioxide and water and, in the presence of light, produce oxygen in support of the D.O. balance in a normal stream. With insufficient light, the population of these aquatic plants is reduced and their normal benefits to a stream are lost.

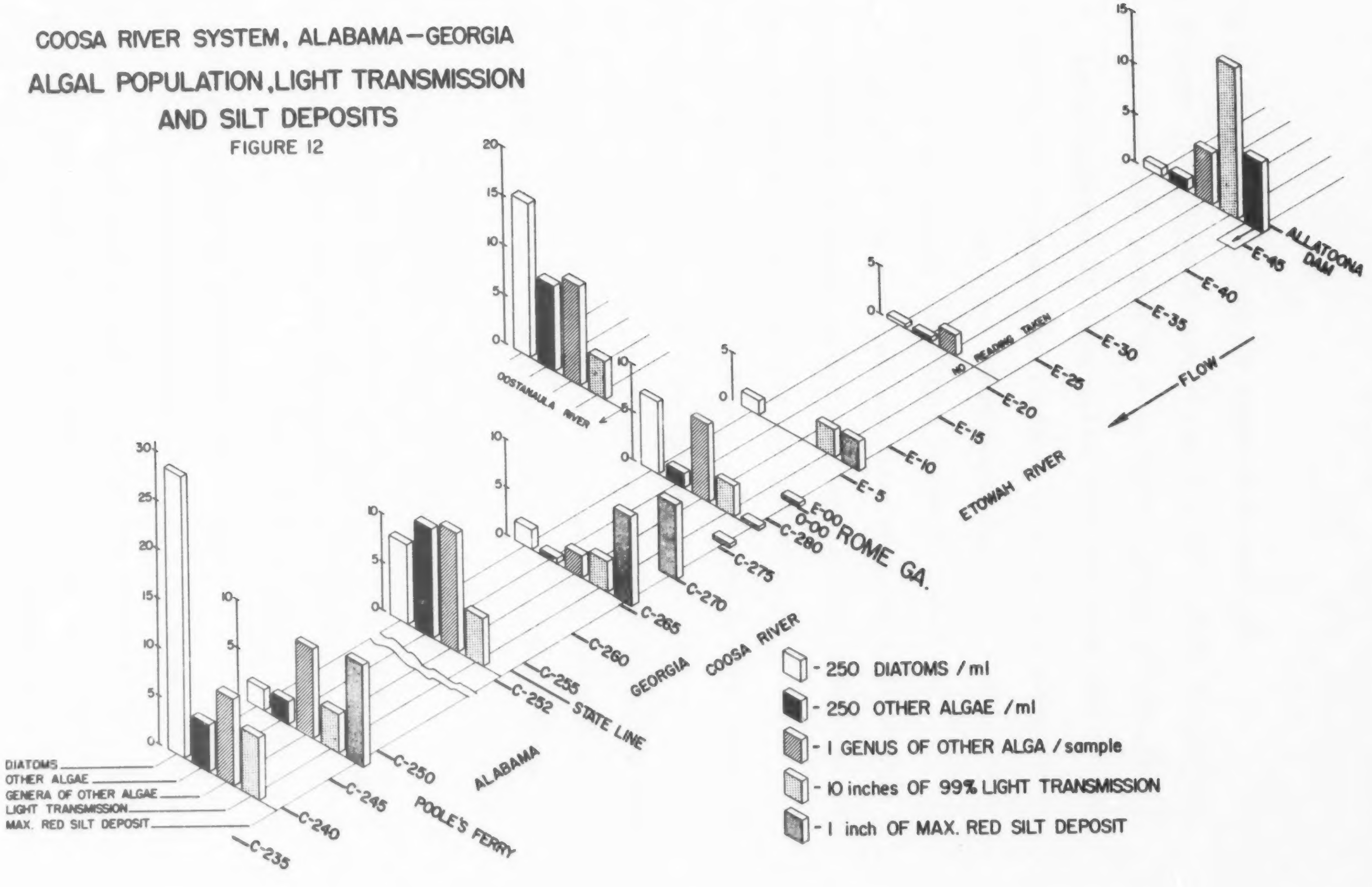
The limit for growth of higher aquatic plants lies between 2.5 and 3.5 per cent of the total surface light energy at bottom depth. There is evidence that certain algae can grow at levels of 1 per cent of the incident light.

The depths at which a given percentage of incident light remains in the Coosa System are shown in Table A-9 and Figure 12. Light transmission is affected by turbidity, which may consist of both inorganic silt and algae.

The water as it left Allatoona Reservoir was clear. Ten per cent of the incident light remained at the bottom (60 inches of water) in the center of the stream. Downstream on the Etowah River below Station E-6.4, the water carried reddish silt and 1 per cent of the incident light remained in only 26 inches of water. Since the algal population was very low at this location, the low transparency was attributable to the inorganic silt load. The potential for algal development at this station was restricted to about 2 feet by the availability of light and further hampered by the physical action of the silt on algal cells.

COOSA RIVER SYSTEM, ALABAMA—GEORGIA
ALGAL POPULATION, LIGHT TRANSMISSION AND SILT DEPOSITS

FIGURE 12



The Oostanaula River was carrying a dense algal growth at the time of study. One per cent of the incident light remained at 37 inches and 2.5 per cent remained at 30 inches. The low light transparency at this point was principally caused by suspended algae. A bloom, or extremely heavy growth, of algae was present on the surface of the river at the time of the light transparency readings.

Light transmission was again restricted on the Coosa River, and since the algal population was low, silt was the contributing factor. The depth of effective light penetration gradually increased until at the state line 1 per cent of the incident light remained at a depth of 48 inches and 2.5 per cent of the incident light remained at 37 inches. At Poole s Ferry, light readings were taken at a time when surface winds were strong and there was mixing of the water. Undoubtedly, silt from the lower water layers and lake bottom became redistributed throughout the water resulting in a reduction of the 1 per cent light transmission zone to 39 inches.

A station near the center of Lake Weiss yielded the greatest algal population found during the survey (8,383 per ml) as well as the deepest light transmission zone with 1 per cent of the incident light penetrating to a depth of 65 inches.

As a control point, photometer readings were taken from the bay of Lake Weiss into which the Chattooga River discharges. Light transmission at this point was similar to that of Lake Weiss, extending to a depth of 53 inches and 2.5 per cent of the incident light was present at a depth of 41 inches.

Fish

Preimpoundment fish population studies of the Coosa and Chattooga Rivers were made by Dr. Homer S. Swingle, Alabama Polytechnic Institute, under contract with the Alabama Water Improvement Commission, and in cooperation with the Alabama Department of Conservation (Table A-10). Rotenone was used to collect fish samples. The Coosa River studies were conducted near Sewell Ferry, which is about 10 miles below the state line. The Coosa River was muddy at the time of sampling at both the station 2-1/2 miles above Sewell Ferry and 2-1/2 miles below Sewell Ferry. Approximately 1 acre in area was sampled on the Coosa River, and the depth of water at the sampling points varied from 14 to 16 feet. On the Chattooga River a 0.5 acre sample area was used, and at this location the depth ranged from 3 to 9 feet, with an average of 6 feet. For the purposes of comparison in Table A-10 these data were converted to the acreage basis.

The report, dated December 1958, states that the fish population in the vicinity of Sewell's Ferry was in good balance, but over 50 per cent by weight were composed of redhorse suckers. In the upstream sample area game fish made up only 0.4 per cent by weight of the population and in the downstream sample area only 5 per cent by weight. The principal game fish present were spotted bass, walleye, black crappie and bluegill. Largemouth bass, the most desirable of the sport fishes, was absent from this area of the Coosa River. Blue, channel and flathead catfish were present and are expected to expand into a valuable part of the impoundment population.

The Georgia State Game and Fish Commission conducted an electrofishing survey on the Coosa River 9 miles below Rome on September 3, 1959. Forty-four fish were captured, 20 of which were game fish. The game fish included 1 largemouth bass, 1 spotted bass, 16 bluegills, 1 yellowbelly sunfish and 1 longear sunfish, and made up 21.5 per cent by weight of the total fish composition.

The results of a current electrofishing survey(1-hour duration) on the Oostanaula River above Rome, the Coosa River 2 miles below Rome, and on the Coosa River 2 miles below the Georgia-Alabama State Line are comparable (Table A-11). A similar number of game species were found at each station and no great difference in size was noted. There was an indication, however, of a larger population of carp in both Coosa River samples and of shad in the Coosa River sample below the state line.

The creation of Weiss Reservoir improves the fishing potential in the tributary streams because it serves as a constant supply source, from which fish can migrate into the tributary streams from the reservoir.

Silt

Direct damage to fish by sediment has not been determined. In most cases indirect damage to the fish population through destruction of the food supply, eggs, or changes in the habitat probably occur long before adult fish are directly harmed.

It has been found that silt is not very dangerous to fish eggs and developing fry in the normal stream if excess occurs only at intervals; however, the character of such normal streams can be drastically altered by allowing the washings of quarries, gravel pits, mines, etc., to flow into the stream untreated. Continuous application of even small quantities of silt over spawning beds may be extremely detrimental to the welfare of very young fish. From a practical standpoint the damage to fish spawning beds occurs when mining silt enters a stream at times other than storm periods when the water velocity is insufficient to carry the sediment in suspension.

Turbidity reduces the enjoyment of fishing and limits the success in terms of fish caught. In clear water the field of fishes' vision increases and they are able to see food at increased distances. Work at Fork Lake, Illinois, indicates that approximately 6.5 fish were caught per man hour of fishing when the water transparency was measured at 4 feet, whereas, only 2 fish were caught per man hour when water transparency was limited to 0.5 - 2.0 feet.

Only a small amount of sand or silt shifting in and around the gravel of the bottom eliminates much of the area suitable for the attachment or hiding of the aquatic insects, and drastically reduces the total production of these forms. Small amounts of sand not discernible by casual inspection, but evident only on close examination of the bottom materials, can bring about significant changes.

Settleable solids may promote a number of changes within the environment: (1) blanket the substrate, (2) screen out light, thus restricting bottom plants and floating algal forms, (3) floc planktonic algae out of the water and carry it to the bottom to die, (4) change head radiation, (5) retain organic materials and other substances which create unfavorable conditions on the bottom, (6) interfere with fish feeding, (7) smother fish eggs, and (8) produce a grinding and crushing action deleterious to benthic forms.

Observations indicate that heavier silt and sand particles continually roll downstream in the Etowah River, temporarily settling above riffle areas and becoming resuspended immediately below as the current pushes the particles over the riffles. This phenomenon produces a muddy water appearance below shallow obstructions in the main channel. Any type of current deflector on the bottom in the center of the stream causes immediate settling of silt on the downstream side of the obstruction.

A thin layer of fine silt gradually settles into the bottom sand in the channel during times of low stream flow. At times of substantially increased flow, the silt is rolled up and resuspended from the sandy bottom by the force of the current and forms clouds of red water.

In regions of reduced stream velocity along the stream bank and downstream from an inside meander, the silt settles and deposits on the bottom substrate. A reduction in stream velocity also occurs in the upper end of Lake Weiss with the resultant build-up of silt on the bottom of the flowage in the region of the old channel (Table A-12).

Silt was found in the center of the channel adjacent to Poole's Ferry (Lake Weiss) and in the downstream vicinity. A depth of 10-1/2 inches was reached at Poole's Ferry. Approximately 1 mile downstream, the channel deposition had been reduced to 4 inches and another mile downstream 3 inches of silt were found.

Barium, which occurred in the mineral ores but not in soil erosion sediments, was used to trace the deposition of mineral washing waste solids in the Etowah and Coosa Rivers. Barium was found in the Etowah and Coosa River core samples (Table A-13). Barium was not found in core samples collected from the Oostanaula River and Pumpkinvine Creek above Highway 41. These data indicate that mining silts containing barium, that are introduced into the Etowah River, are carried into the Coosa River eventually reaching the upper end of Lake Weiss in Alabama. Greatest silt deposition (10-1/2 inches) occurred near the upper end of Lake Weiss, River Mile 247.9 (Table A-12) where 4.7 mg/g (dry weight) of barium was found. The largest concentration of barium was found in the New Riverside sludge pond (10.8 mg/g) and at River Mile E-44.5 in the Etowah River (7.0 mg/g).

SUSPENDED SEDIMENT LOADS

AUGUST 1962 SURVEY

Introduction

Knowledge of periodic waste discharge schedules and cyclic river flow patterns is necessary for an understanding of suspended sediment loads in this river system.

The New Riverside Ochre Company discharges about 500 tons per day of clay into the Etowah River at River Mile E-46.3 between Allatoona Dam and Cartersville. This plant operated on a five-day workweek from Monday through Friday. Clays washed from raw ore flowed to an intermittent holding pond during each operating day. About 8:00 P.M. each evening, low level sluice gates were opened and the ponded wastes were sluiced to the river during a 45 to 60 minute draining period.

Operations at this plant during the August survey appeared similar to those observed during the earlier July 1962 preliminary survey. Most solids discharged to the river during the evening periods of low river flow settled out and remained in the discharge area overnight. When the Allatoona Dam turbines were opened the next morning, the swift turbulent river current scoured the river bottom, resuspended the settled solids and carried the accumulated clay and silt load downstream.

The Thompson Weinman Company processes barites ores at their Paga Mines near Cartersville. Clays washed from the raw ores are discharged to three large holding ponds covering some 160 acres. Supernatant liquor withdrawn from these ponds enters the Etowah River near the Cartersville sewer outfall at River Mile E-40.8, between sampling Stations E-44.5 and E-39.0.

These waste holding ponds were observed on July 18 during the preliminary field survey. One pond had been drained to the bottom of the outlet control box and small quantities of silty wastes continued to flow out through the leaking gate structure. A large depression had been scoured out of the exposed accumulated sludge mass. This cavity in the pond bottom and the presence of mud shoals along the sides of the outlet ditch showed that large quantities of clay had been sluiced through the holding pond and out into the river. This condition was called to the company's attention and the pond operating procedure was corrected shortly thereafter.

During the August survey, Thompson Weinman Company exercised diligent supervision over these ponds and obtained excellent solids removal efficiencies. In fact the suspended solids concentration of eight samples, collected from the pond with the greatest outflow, ranged from 15 to 105 for an average of 34 mg/l. Based on a total estimated outflow of 1 million gallons per day this would amount to only 0.14 tons of solids per day. These results prove that proper supervision and operation of waste holding ponds can practically eliminate mineral washing silt pollution of the Etowah River.

River Discharge

A general reference summary of river discharge data obtained during the 1962 survey is posted on Table No. A-14.

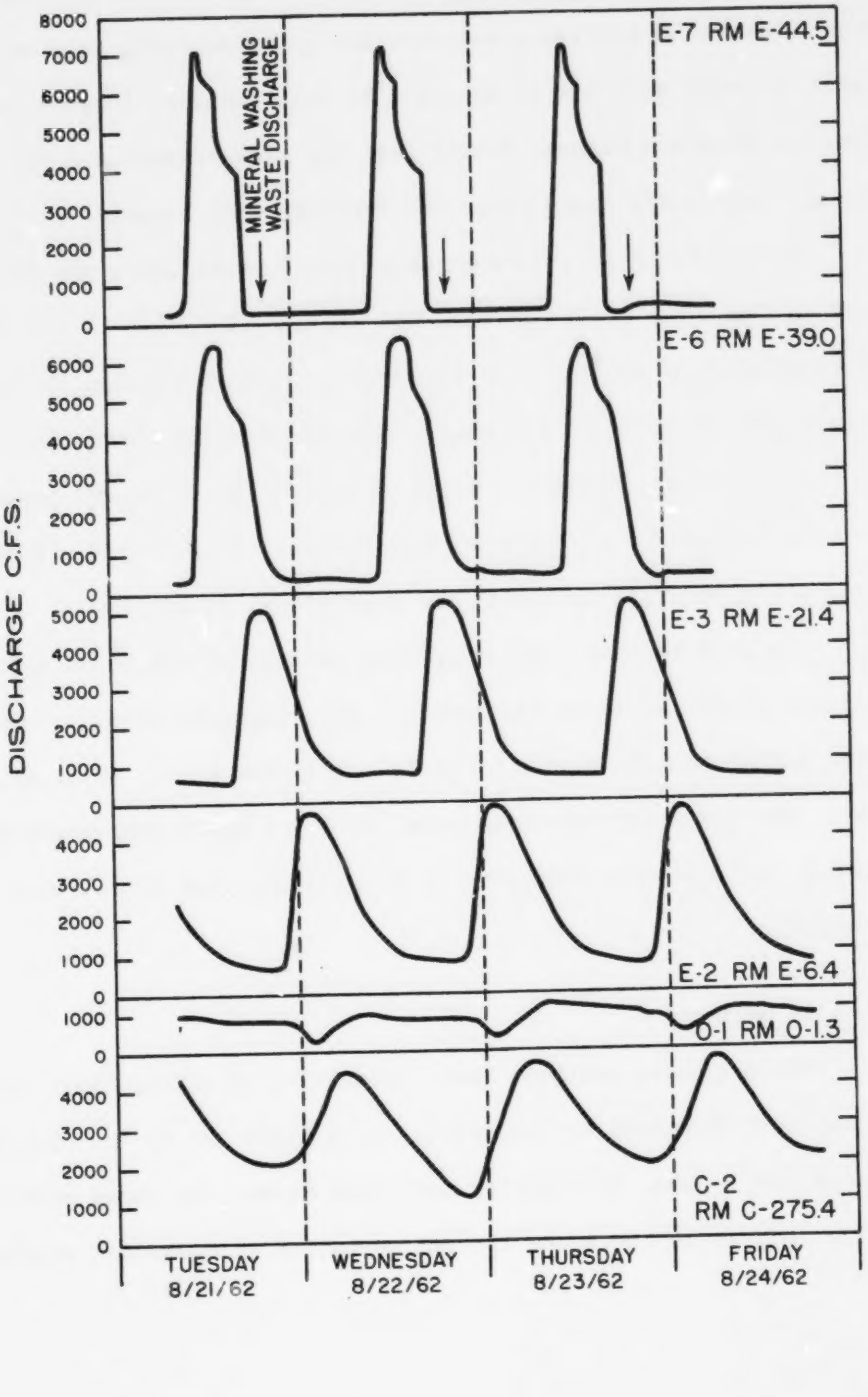
Hydrographs showing the diurnal discharge variations at the Etowah River sampling stations are shown on Figure 13. These hydrographs and 1962 stream flow studies are based on provisional discharge data furnished by the U. S. Geological Survey and the U. S. Army Corps of Engineers.

Minimum Etowah River flows of approximately 300 cfs occurred throughout the evening and early morning hours when the Allatoona Dam turbines were shut down. During the August special study period, the first turbine, releasing approximately 3500 cfs, was opened at 11:00 A.M. The second turbine was opened at noon and the flow increased to approximately 8,000 cfs. At 2:00 P.M. the first turbine was shut down and the flow gradually subsided from 5,000 to 4,000 cfs. At 6:00 P.M. the second turbine was also shut down and the river flow again returned to the minimum 300 cfs rate.

The top hydrograph of Figure 13, showing the Etowah River discharge at Station E-44.5, some 2 miles below New Riverside Ochre Company, parallels the Allatoona Power Dam turbine operating schedule. The low, 300 cfs, flow prevailed for about 17 hours and then climbed rapidly to a 7,300 cfs peak at 12:15 P.M., a little over an hour after the turbines were opened.

COOSA RIVER SYSTEM, GEORGIA - ALABAMA
ETOWAH, OOSTANAULA AND COOSA RIVERS
DISCHARGE
DIURNAL VARIATIONS OF INSTANTANEOUS RATES IN C.F.S.

FIGURE 13



During the next 6-hour period the flow subsided according to the turbine operating schedule and shortly after 6 o'clock it returned down to 300 cfs.

About 5 miles downstream, at Station E-39.0, a similar discharge pattern prevailed but the peaks were not quite so sharp and the changes in discharge rates were not so abrupt. At this station, located some 2 miles below the Thompson Weinman facilities, the flow reached a 6,500 cfs peak approximately 3-1/2 hours after the turbines were opened.

At Station E-6.4, located about 6-1/2 miles above the Etowah River mouth in Rome, the cyclic pattern was still evident but it had leveled off to range from about 700 to 4,500 cfs. At this station the peak occurred about 1:30 A.M., some 14-1/2 hours after the turbines were opened.

Flow in the Oostanaula River in Rome normally ranged between 800 and 1,000 cfs except for an early morning low when the water surface elevations at the mouth were influenced by the peak Etowah River flow.

The more regular undulating flow pattern of the Coosa River at Station C-275.4, reflects the combined flow characteristics of both the Etowah and Oostanaula Rivers at their confluence some 7 miles above this point. The low daily discharge rate, of about 2,000 cfs, occurred around 8:00 P.M. and the flow then rose to a 4,600 cfs peak about 6 o'clock in the morning.

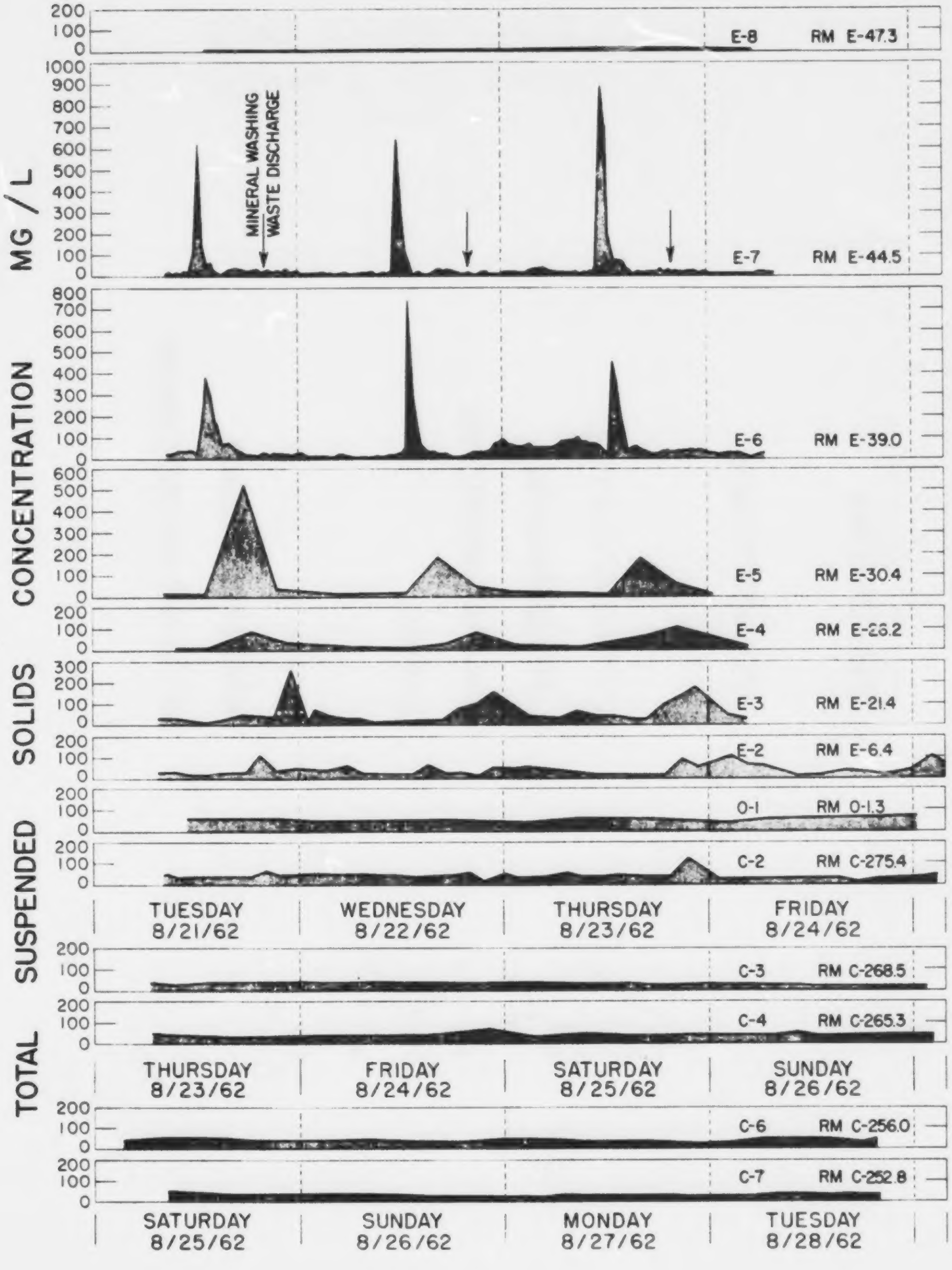
Suspended Sediment

The suspended sediment loads consisting of silts, clays and some fine sands that caused the turbidity and contributed to the apparent color of the Etowah, Oostanaula, and Coosa Rivers are shown on Figures 14 and 15. Figure 14 shows the diurnal variation in suspended solids

COOSA RIVER SYSTEM, ALABAMA—GEORGIA
ETOWAH, OOSTANAULA AND COOSA RIVERS

TOTAL SUSPENDED SOLIDS

DIURNAL VARIATIONS OF CONCENTRATION IN MG / L
FIGURE 14

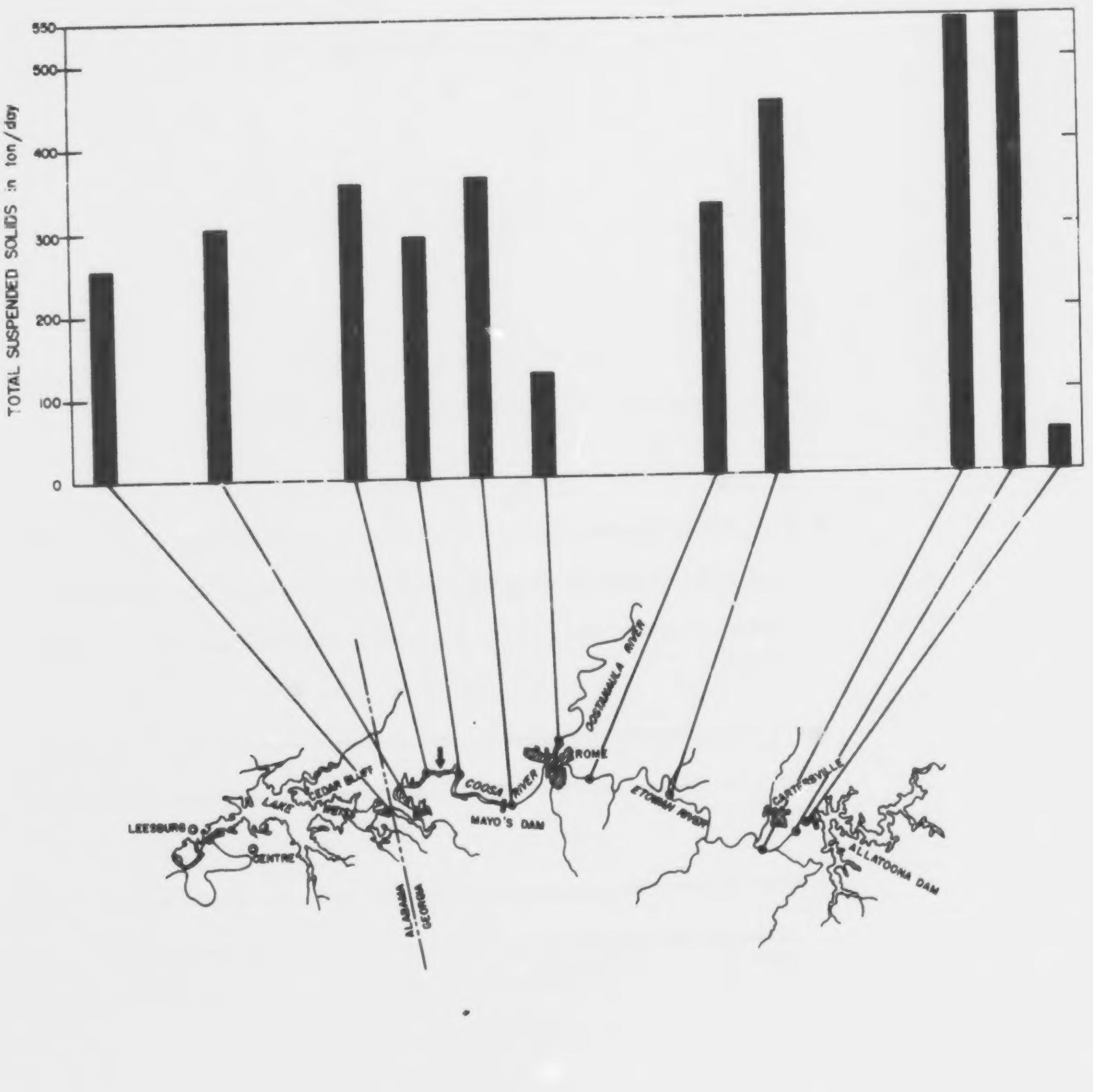


COOSA RIVER SYSTEM, ALABAMA—GEORGIA
ETOWAH, OOSTANAULA AND COOSA RIVERS

TOTAL SUSPENDED SOLIDS

AVERAGE MASS IN TONS/DAY

FIGURE 15



concentrations and Figure 15 shows the average mass of suspended solids flowing down the river system. The mass suspended sediment load was calculated from discharge and suspended solids data collected during the August survey. A summary of the data collected during this special round-the-clock survey is shown on Tables A-15 and A-16. The mass of suspended sediment, computed from frequent round-the-clock discharge and solids determinations, is posted in Table No. A-15.

No discharge records are available for the Coosa River from Mayo's Lock and Dam to the state line. The discharge was assumed to approximate the averages observed at the Coosa River gage at Mayo's Lock and Dam. The mass of solids in this reach was calculated from measured solids concentrations and estimated discharges, and posted in Table A-16.

The sediment load suspended in the river waters does not include the bed load or the heavier solids that gravatate to the river bottom and then slide, tumble, or roll downstream along the river bottom without becoming resuspended in the upper water layers. Bed loads were not determined.

The clear water released from Allatoona Dam and flowing past Station E-47.3 contained very little suspended sediment. Here the suspended solids concentration ranged from 10 to 15 mg/1 for an average of 12.5. The total mass amounted to 56 tons per day.

At Station E-44.5, some 2 miles below the New Riverside Ochre Company, the suspended solids concentrations were as low as 5 mg/1 during the nightly low flow portion of the 24-hour cycles. During low flows, the Etowah River was quite clear and contained only a slight shade of grayish-tan color.

The color and turbidity increased sharply around 11:30 A.M., about one-half hour after the turbines were opened. During the next hour the suspended solids concentrations increased to 900 mg/l peaks, and the color turned deep reddish-tan as most of the waste solids, which had been deposited the previous evening, were resuspended and flushed past this station. The suspended solids concentration subsided from about 12:30 A.M. to 2:30 P.M. and remained at or below 25 mg/l during the next 20 hours of the daily cycles.

The arithmetic average suspended solids concentration of 120 samples collected from this station during the special study was 52 mg/l. As shown on the bar charts, approximately 550 tons per day of suspended solids were carried past this station. Approximately 500 of this 550 ton total was discharged by the New Riverside Ochre Company.

At Station E-39.0, below the Thompson Weinman facilities, the general suspended solids concentration pattern was similar but the peaks were somewhat flattened. Here the concentrations ranged from 10 to 750 mg/l for an average of 61 mg/l. The peak occurred approximately 2 hours after the Allatoona Dam turbines were opened. Increased concentrations during the morning of Thursday, August 23, reflected the influence of a heavy rainfall which occurred in the upper reaches of Pumpkinvine Creek the day before. At times during Wednesday and Thursday the Pumpkinvine Creek concentrations ranged from 100 to 300 mg/l and the

24-hour silt load amounted to approximately 50 tons. During the earlier general survey, the Pumpkinvine Creek concentrations were usually below 20 with only a few samples showing 30 mg/l. Since the Pumpkinvine Creek inflow represented only a small percentage of the total Etowah discharge, the increased tributary silt load during this one day did not materially effect the 3-day average suspended sediment load in the Etowah River.

The arithmetic average concentration of the Etowah River silt at Station E-39.0 was 61 mg/l as compared to the 52 mg/l observed at the previous upstream sampling station. The 549 tons per day weighted average mass of solids passing this station was almost identical to the 550 tons per day average for the upstream station. Observations at these 2 sampling stations show that the Thompson Weinman Company, located between these 2 points, did not discharge any significant quantity of silt to the river during this study.

At stations farther downstream the peaks were not so sharp or so well defined. During each daily cycle at the last downstream Etowah River Station E-6.4, the concentrations increased to a high level plateau rather than to a sharp peak. Here the concentrations ranged from 20 to 120 mg/l for an average of 48 mg/l. Waters containing the higher concentration of suspended sediments passed through this reach shortly after midnight. The total suspended sediment load amounted to 329 tons per day. This was approximately 200 tons per day less than the 550 tons per day from the Cartersville area. Undoubtedly a large portion of this difference in measured load passed downstream along the bottom as bed load.

Although the Etowah River bottom was relatively free from sediment deposits, some of these solids may have settled out along the banks and in quiet pools where they remained until resuspended and carried downstream during subsequent extreme peak discharges.

During daylight hours there was no great difference between the appearance of the Etowah and the Oostanaula Rivers at their junction in Rome. Both rivers were light to medium tan colored. The Oostanaula had a grayish-tan cast, usually associated with the erosion of top soil to the river. The Etowah had a distinctive reddish-tan cast, more nearly resembling the color of the underground formations that are mined in the Cartersville area.

Suspended sediment was much more uniform in the Oostanaula River waters entering Rome, Georgia. These concentrations ranged from 40 to 65 mg/l with an average of 55 mg/l. The suspended sediment load amounted to 125 tons per day. It is understood that in previous years the Oostanaula was considerably clearer during this season of the year. During August 1961, for example, the turbidity averaged 30 or approximately 1/2 of the 55 average turbidity units observed during the August 1962 survey. Grading operations on new U. S. Highway 75 near the upper reaches of the Oostanaula River during 1962 may account for part of this year's unseasonably high turbidity in the Oostanaula River.

There were no real distinct peaks or valleys in the suspended solids concentrations in the Coosa River below Rome.

At Station C-275.4, 7 miles below Rome, the concentration ranged from 20 to 130 with an average of 45 mg/l. The total suspended sediment load amounted to 365 tons per day.

At Station C-268.5, 14 miles below Rome and approximately 1 mile above the Rome Kraft waste outfall, the solids concentration range was further reduced to 25 to 45 with an average of 34 mg/l. The total load amounted to 295 tons per day.

At Station C-265.3, about 2 miles below the Rome Kraft outfall, the range of solids concentrations increased to 30 to 70 with an average of 42 mg/l. The total load was 357 tons per day.

Crossing the state line, at Station C-252.8, the solids concentrations ranged from 15 to 50 mg/l with an average of 30 mg/l. The total suspended sediment load was 257 tons per day.

The appearance of the Coosa River below Rome reflected the blending of the reddish and grayish-tan colors of the Etowah and Ooostanaula Rivers. Throughout the August survey there was no distinct difference in the color and appearance of the Coosa River downstream from Rome, across the state line and to Poole's Ferry in Alabama. In the vicinity of Poole's Ferry, and farther down towards Cedar Bluff, more of the fine suspended solids settled out and the color, turbidity and general appearance improved as the waters flowed through Lake Weiss. The lake, though moderately turbid in the upper flowage areas, was very clear from Cedar Bluff to the outlet.

Local fishermen and property owners advised members of the survey team that they had never seen the Coosa River and upper Lake Weiss nearly so clear as it appeared during this August 1962 survey. During the July 1962 preliminary survey the appearance of the Coosa River and upper Lake Weiss was considerably more turbid and dingy than in August. The Etowah River was much more turbid and highly colored, especially during the daylight hours. In fact, during July there was a distinct line of demarkation and contrast between the reddish, muddy-appearing Etowah River and the relatively clear Oostanaula River at their confluence.

During the August survey, the Coosa River and upper Lake Weiss undoubtedly appeared much clearer than during the corresponding season in late August and early September of 1961. The degree of improvement is evident from the summary of August-September Etowah and Oostanaula turbidity data collected by the Rome City Water Department and discussed in a subsequent section of this report.

Variations in Suspended Sediment

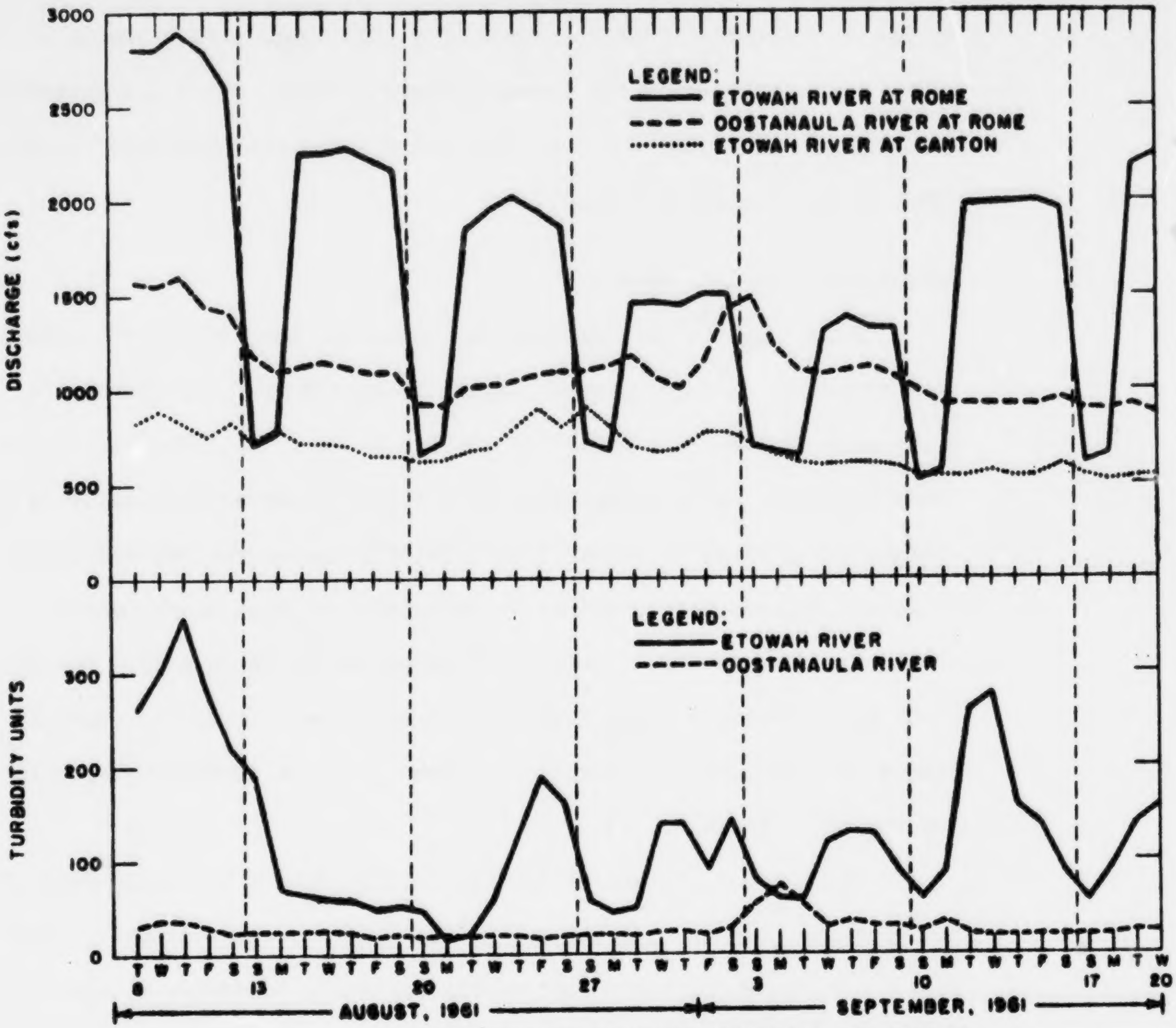
The changes in Etowah River suspended solids concentrations were so great that the results of single grab samples could be misleading. For example, a sample collected before 11:00 A.M. from Station E-44.5 could contain less than 1/5 of the average 24-hour silt load. Conversely, a sample collected at 11:30 A.M., at peak flows, would indicate that the river was carrying almost 10 times the actual 24-hour silt load. Similar, but smaller differences could occur in single grab samples collected from the lower reaches of the Etowah River. At Rome, for example, where the range of concentrations had been greatly compressed, a grab sample collected at noon would contain less than 1/2 of the actual 24-hour average solids concentration. If collected about midnight, such a sample could contain more than twice the average concentration. Gross discrepancies of this type were eliminated by sampling at frequent intervals round-the-clock during the special study.

COMPARISON WITH 1961 DATA

From August 8 to September 20, 1961, the Rome City Water Department measured the turbidity of samples collected from the Etowah and Oostanaula rivers between 9:30 to 10:00 A.M. each day. The results of these turbidity tests along with the U.S.G.S. recorded mean daily discharges are plotted on Figure 16. Turbidity concentrations and river discharge figures were combined to calculate the equivalent mass of turbidity in equivalent tons per day as posted in Table A-17. The equivalent mass passing through Rome in each of these 2 rivers is shown in Figure 17. The mean discharge, by months, for the last 10 water years are posted in Table No. A-18.

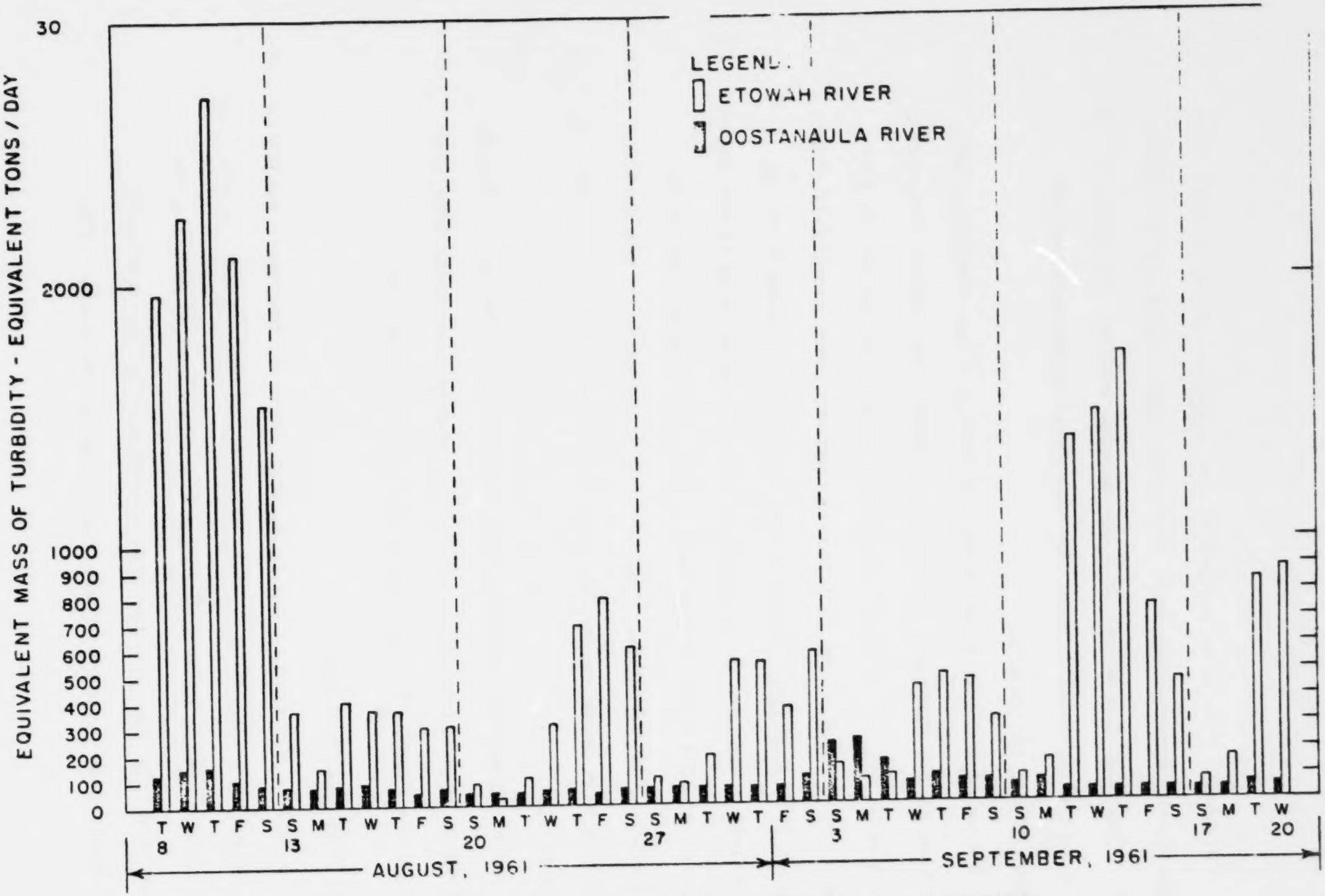
The general pattern of low turbidities during the early part of the week and high turbidities during the middle or latter part of the week corresponded to the normal weekly operating schedules at the mineral washing installations near Cartersville.

During the middle of the week, the Etowah River turbidity concentrations were 5 to 10 times higher than the turbidity of the Oostanaula River. Furthermore, the equivalent mass of turbidity, flowing through Rome in the Etowah River, was 8 to 30 times that in the Ooostanaula River.



COOSA RIVER SYSTEM, GEORGIA - ALABAMA
OOSTANAULA AND ETOWAH RIVERS AT ROME GEORGIA
DISCHARGE AND TURBIDITY
AUGUST - SEPTEMBER 1961

FIGURE 15



COOSA RIVER SYSTEM, GEORGIA - ALABAMA
OOSTANAULA AND ETOWAH RIVERS AT ROME GEORGIA
TURBIDITY
MASS IN EQUIVALENT TONS PER DAY—AUGUST-SEPTEMBER 1961

Figure A-17

Obviously, the major portion of the suspended sediment load came from the Etowah River above Rome. No known large sources of suspended solids, other than the wastes from the mineral washing operations in the Cartersville area, could account for this great difference between turbidity of the two rivers.

The average Etowah River discharge during August-September 1961 was similar to the discharge during August 1962. The measured turbidity concentrations and the computed equivalent mass of solids moving down the Etowah River during the 1961 season, however, were about 2-1/2 times the August 1962 loadings. Based on the fluctuations revealed by the round-the-clock studies, it is probable that the daily peak Etowah River turbidities in 1961 also entered Rome during the midnight and early morning hours, and the actual total 24-hour loads exceeded the observed values which were based on samples collected between 9:30 and 10:00 A.M. in the morning.

These comparisons indicate that in addition to the New Riverside Ochre Company load, waste solids from other mining operations were discharged to the Etowah River during August and September 1961.

RELEASES FROM ALLATOONA DAM

The Mobile District of the U. S. Army Corps of Engineers maintains complete operating records on the Allatoona Power Dam. These records show that for several years after 1950 ~~1955~~, when the Allatoona project started full operation, the sluice gates were opened briefly (approximately 15 minutes) about once a year to check the operating machinery. This practice was discontinued in 1954, and since that time the sluices have been opened on only 1 occasion. On January 7, 1962, the sluice gates were opened for 5 hours between 2:00 A.M. and 7:00 A.M. to discharge flood waters stored in the reservoir.

The Corps of Engineers surveyed cross sections of the natural terrain above the Allatoona Dam site before the dam was constructed and the area inundated. Resurveys of key ranges in 1949, 1950, 1953, 1958, 1960, and 1961 indicated that sediment deposits in the Allatoona Reservoir were negligible.

The Corps of Engineers collected suspended sediment samples from the Etowah River at approximately monthly intervals from August 1961 through July 1962. The results of tests on these samples, collected during periods of both high and low flows from Stations E-47.0 immediately below Allatoona Dam to Station E-21.4 at U. S. Highway 411 near Kingston, Georgia, are posted on Table A-19. The individual test results from these samples cover a wide range of stream conditions. The samples collected below Allatoona Dam, which is above all sources of mineral washing wastes, provides a year-round picture of the unpolluted upstream Etowah River waters. The suspended sediment content of 16 samples collected at this point averaged 11 mg/l. The extremes varied from a low of 1 mg/l to a single day maximum of 46.2 mg/l. The solids concentration in 15 of the 16 samples was below 20 mg/l.

The negligible amount of silt deposited in Allatoona Reservoir proper, the fact that the sluice gates were opened for only a few hours in the years since 1950, and the consistently low turbidity immediately below the dam show that the Etowah River silt problem is not caused by releases from Allatoona Dam.

ROAD BANK EROSION

Research on erosion from road banks is conducted by the Coosa Watershed Project of the Agricultural Research Service in Cartersville. Their studies to date show that the annual soil loss from 6 plots has varied from a minimum of 25 tons per acre to a maximum of 359 tons per acre. The extent of erosion varies according to orientation, slope, type of soil, intensity of precipitation and other factors. Frost action and bank orientation had been 2 of the principal contributors to the erosion process on the unprotected road cuts. Planting 30 species of ground cover on 850 experimental road bank plots proved that adaptive plants on properly fertilized areas can develop an effective cover which will control bank erosion.

Lacking data on the total acreage of unprotected road banks, it was not possible to estimate the proportionate soil loss entering the rivers from this source. Road bank erosion control work continues to increase on major highways in the area, but there is very little control on minor roads. The road banks on most major highways and all new Federal highways, including new Interstate 75 under construction parallel to U. S. Highway 41 from Dalton to Cartersville, are or will be seeded for erosion control.

Control of road banks has received increasing attention in recent years and it is expected that these control efforts will be further expanded in the future. Such a program will continue to reduce the amount of sediment reaching the rivers from these sources.

SOIL EROSION

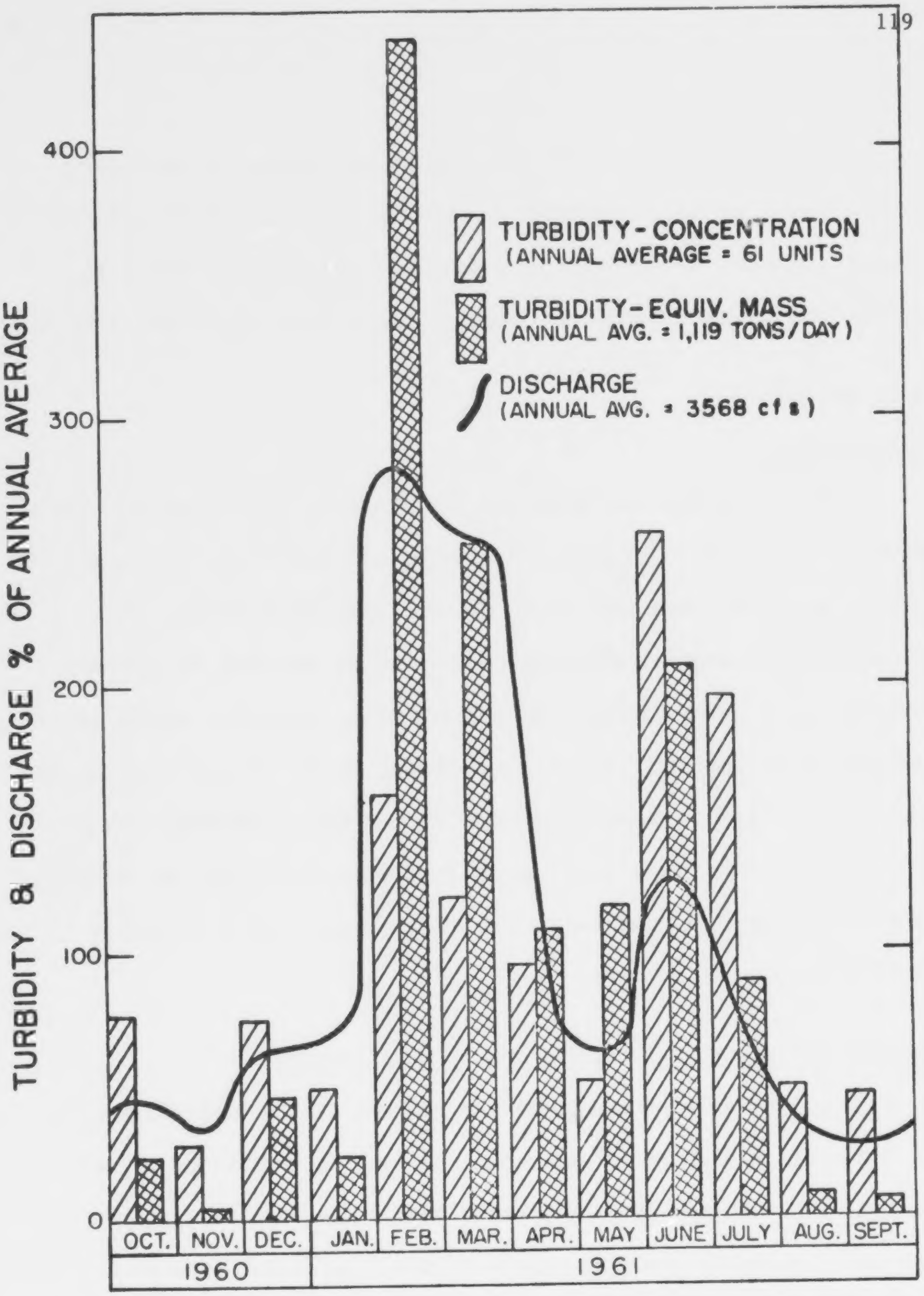
Introduction

Turbidity and the total sediment load of the Etowah and Coosa Rivers is related to normal soil erosion as well as the man-made discharge of solids into this river system. Research studies, field findings, and general information provided by the many cooperating agencies previously listed were correlated to determine the probable amounts of eroded soil reaching the Etowah River. These studies show that erosion is not directly related to the total rainfall nor the total runoff. It does, however, respond almost directly to the frequency of excessive-rate rainfalls which precipitate 1/2 inch or more of rain in 30 minutes.

Monthly Variation of Turbidity Due to Soil Erosion

Daily discharge and turbidity records of the Oostanaula River at Rome were evaluated to determine the monthly variations of natural turbidity during the 1960-1961 water year. The results of this analysis are shown in Tables A-20 through A-22 and Figures A-1 through A-4 and summarized on Figure No. 18.

The maximum monthly average concentration of turbidity occurred in June. The 156 unit monthly average was 256 per cent of the 61 unit annual average.



OO.STANAULA RIVER AT ROME, GEORGIA
TURBIDITY & DISCHARGE
PERCENT OF ANNUAL AVERAGE

FIGURE 11

The maximum monthly average mass of turbidity occurred in February. The 4,927 equivalent ton per day monthly average was 440 per cent of the 1,119 ton per day annual average.

The minimum monthly average concentration occurred in September. The 28 unit monthly average was 46 per cent annual average.

The minimum monthly average mass of turbidity also occurred in September. The 81 equivalent ton per day average was 7 per cent of the annual average.

The August turbidities were only slightly higher than the September minimums. During August the 30 unit concentration was 49 per cent and the 103 ton per day mass was 9 per cent of the respective annual averages.

Annual Soil Erosion Loss to Etowah River

From observations at selected test plots, the Soil Conservation Service estimated the soil loss and delivery to the streams for various types of land use in the Etowah River watershed between Allatoona Dam and Rome. Estimated annual soil losses for this area are posted in Table No. 4. The summary shows that approximately 230,000 tons of soil per year reached the Etowah River between Allatoona Dam and Rome. This amounts to an annual average loss of 630 tons per day.

Soil Erosion Rates During Specific Months of the Year

According to the previous water year study, maximum soil loss usually occurs during the month of February. The average soil erosion loss to the Etowah River between Allatoona Dam and Rome in February approximates 440 per cent of the annual average, or 2,772 tons per day.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

ESTIMATED SOIL EROSION DELIVERY TO THE ETOWAH RIVER

TABLE NO. 4

(Calculated from Estimated Sediment Rates Provided by
Soil Conservation Service State Office, Athens, Georgia)

WATERSHED NUMBER	LAND USE			SOIL LOSS		DELIVERY	
	Type	%	Acres	Tons/ Acre/ Year	Tons/ Year (X1000)	Rate %	To Stream Tons/Year
ETOWAH RIVER (Between Allatoona Dam and Rome, Ga.)							
13	Cultivated	5.9	5,673	23.5	133		
	Pasture	6.5	6,250	5.5	34		
	Forest	72.9	70,101	4.5	315		
	Idle & Misc.	14.7	14,136	14.5	205		
	Total	100.0	96,160	7.14*	687	8.2	56,000
14	Cultivated	7.6	2,601	25.5	66		
	Pasture	6.5	2,225	6.2	14		
	Forest	83.6	28,614	7.1	203		
	Idle & Misc.	2.3	787	15.3	12		
		100.0	34,227	8.62*	295	11.3	33,000
15	Cultivated	25.7	33,863	11.0	372		
	Pasture	5.9	7,774	4.0	31		
	Forest	63.3	83,407	2.0	167		
	Idle & Misc.	5.1	6,720	15.0	101		
		100.0	131,764	5.10*	671	7.2	48,000
16	Cultivated	15.0	17,986	13.5	243		
	Pasture	20.0	23,982	5.3	127		
	Forest	60.0	71,946	4.3	309		
	Idle & Misc.	5.0	5,996	14.5	87		
		100.0	119,910	6.39*	766	7.7	59,000
34	Cultivated	22.7	18,278	10.5	192		
	Pasture	6.2	4,992	4.0	20		
	Forest	65.4	52,659	2.0	105		
	Idle & Misc.	5.7	4,589	15.0	69		
		100.0	80,518	4.79*	386	8.7	34,000
TOTAL			462,579		2,805		230,000

* Average

13 = Pumkinvine Creek Watershed

14 = Raccoon Creek Watershed

15 = Several small streams draining south into the Etowah

16 = Euharlee Creek Watershed

34 = Several small streams draining north into the Etowah above the junction with the Oostanaula River

During the June period of peak concentration, the loss approximates 207 per cent of the annual average, or 1,304 tons per day.

During the low rainfall period of August, however, only 9 per cent of the annual average, or approximately 57 tons per day of soil from natural erosion reached the Etowah River between Allatoona Dam and Rome.

August Soil Erosion Loss vs. Mineral Washing Waste Solids

Distribution of the 57 tons per day of soil erosion from the 5 sub-watersheds and the 494 tons per day of waste solids from the New Riverside Ochre Company plant is illustrated on Figure 19.

Based on a 5-day workweek, the estimated annual 128,500 ton silt discharge from the New Riverside Ochre Company amounts to 56 per cent of the total soil erosion load. During August, however, the estimated waste solids load was more than 8-1/2 times the total soil erosion loss to the river.

TOTAL SUSPENDED SOLIDS LOADINGS

The sources of suspended sediment loadings introduced into the Etowah and Coosa Rivers during the August survey are posted in Table No.5 and shown on Figure 20.

This figure shows that in the Cartersville area 56 tons per day were contained in the waters discharged from Allatoona Dam. Twenty-four and three-tenths tons per day of soil erosions solids entered via Pumpkinvine Creek. Some 7-1/2 tons per day of organic solids and erosion was carried by Pettit Creek, and it was estimated that approximately 1 ton entered through the City of Cartersville's Etowah River outfall sewer.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TOTAL SUSPENDED SOLIDS LOADING

TABLE NO. 5

SOURCE	TOTAL SOLIDS Tons/Day
Allatoona Lake (E-8)	56
New Riverside Ochre (NR-1)	494
Thompson Weinman (TW-1)	0.14
Cartersville (Sewage Est.)	1.0
Pumpkinvine Creek (PU-1)	24.3
Pettit Creek (PE-1)	7.5
Silver Creek (SI-1)	8.0
Oostanaula River (O-1)	125
Rome (Sewage Est.)	4.0
Rome Kraft (Ind. Waste Est.)	15
Big Cedar Creek (BC-1)	5.0

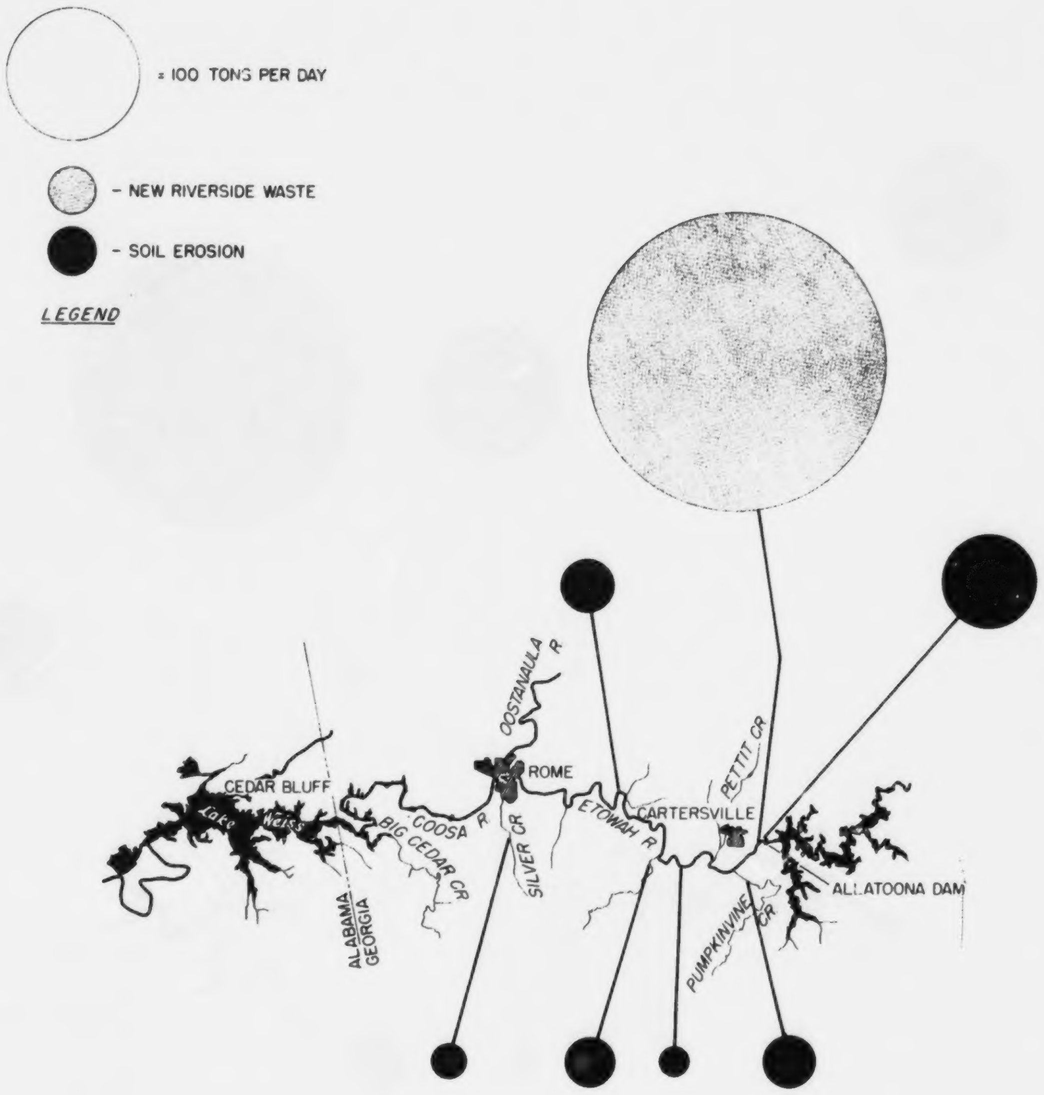
COOSA RIVER SYSTEM, GEORGIA - ALABAMA

ETOWAH, OOSTANAULA AND COOSA RIVERS

SUSPENDED SEDIMENT LOAD COMPARISON

AUGUST 1962

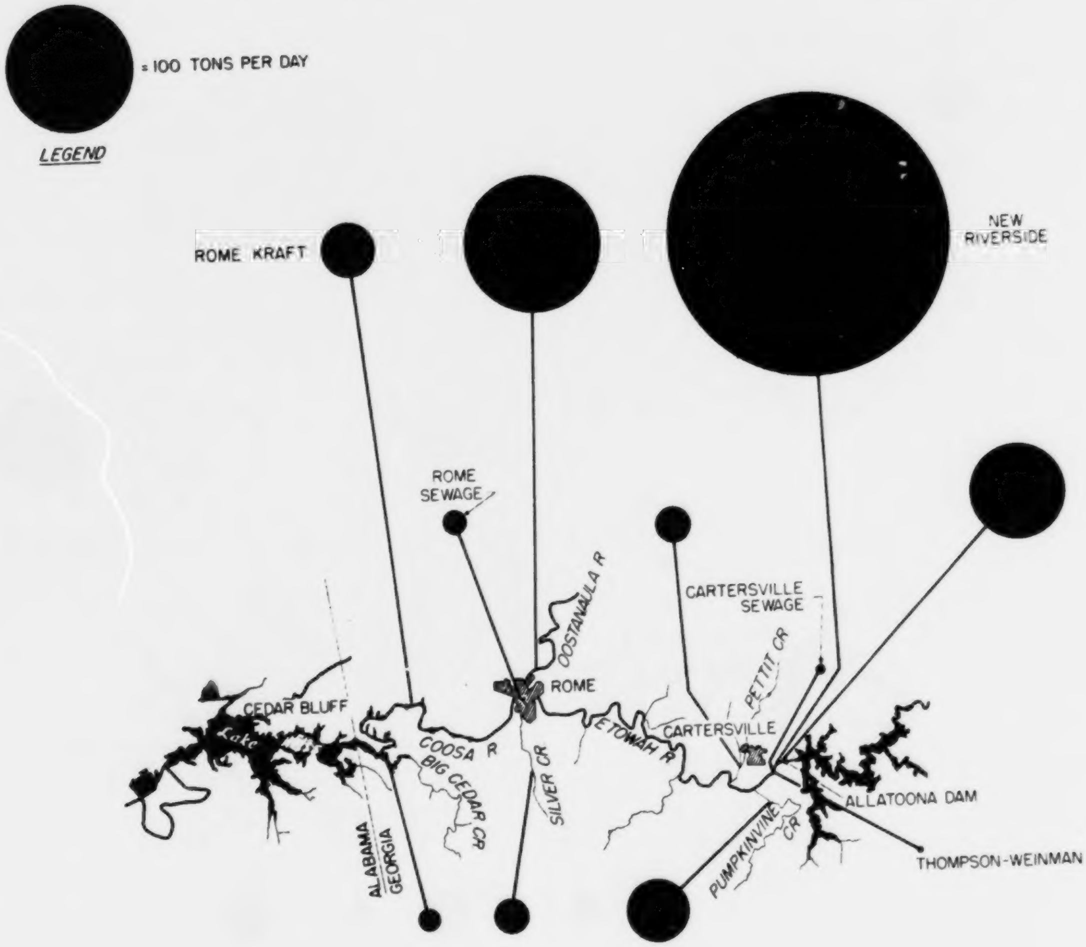
FIGURE 19


= 100 TONS PER DAY
- NEW RIVERSIDE WASTE
- SOIL EROSION
LEGEND
CEDAR BLUFF
Lake Weiss
COOSA R
BIG CEDAR CR
ALABAMA
GEORGIA
OOSTANAULA R
ROME
SILVER CR
ETOWAH R
CARTERSVILLE
PETTIT CR
PUMPKINVINE CR
ALLATOONA DAM

COOSA RIVER SYSTEM, GEORGIA-ALABAMA
ETOWAH, OOSTANAULA AND COOSA RIVERS
TOTAL SUSPENDED SOLIDS LOADING

AUGUST 1962

FIGURE 20


= 100 TONS PER DAY
LEGEND
ROME KRAFT
NEW RIVERSIDE
ROME SEWAGE
CARTERSVILLE SEWAGE
OOSTANAULA R
PETTIT CR
ROME
CEDAR BLUFF
Lake
CARTERSVILLE
COOSA R
BIG CEDAR CR
SILVER CR
ETOWAH R
ALLATOONA DAM
THOMPSON-WEINMAN
PUMPKINVINE CR
ALABAMA
GEORGIA

During the August survey, only 0.14 of 1 ton per day was discharged from the Thompson Weinman waste holding ponds. The majority of the solids entering the river in this area, amounting to 494 tons per day, were discharged by the New Riverside Ochre Company.

In the vicinity of Rome, approximately 8 tons per day were carried by Silver Creek, and it is estimated that approximately 4 tons per day of organic solids were contained in the raw domestic sewage. Approximately 125 tons per day of solids were carried by the Oostanaula River.

Below Rome approximately 15 tons per day of solids were contained in the Rome Kraft waste discharges, and another 5 tons per day entered the Coosa River from Big Cedar Creek.

PER CENT OF TOTAL SUSPENDED SEDIMENT LOAD ATTRIBUTABLE TO NEW RIVERSIDE OCHRE COMPANY WASTE DISCHARGES

Figure 21 shows the relative effect of the New Riverside Ochre Company waste discharges on river water quality in the Etowah and Coosa Rivers.

Above Cartersville, 10.4 per cent of the total solids content of the Etowah River were discharged through Allatoona Dam. The other 89.6 per cent were discharged by the New Riverside Ochre Company.

At the mouth in Rome, the Etowah River contained 329 tons per day, or 221 tons less than the original 550 tons per day at Cartersville. It is assumed that the total 56 tons per day from Allatoona Lake, which had been subjected to long-term storage and settling, flowed undiminished all the way down the Etowah and the Coosa Rivers. Based on this assumption,

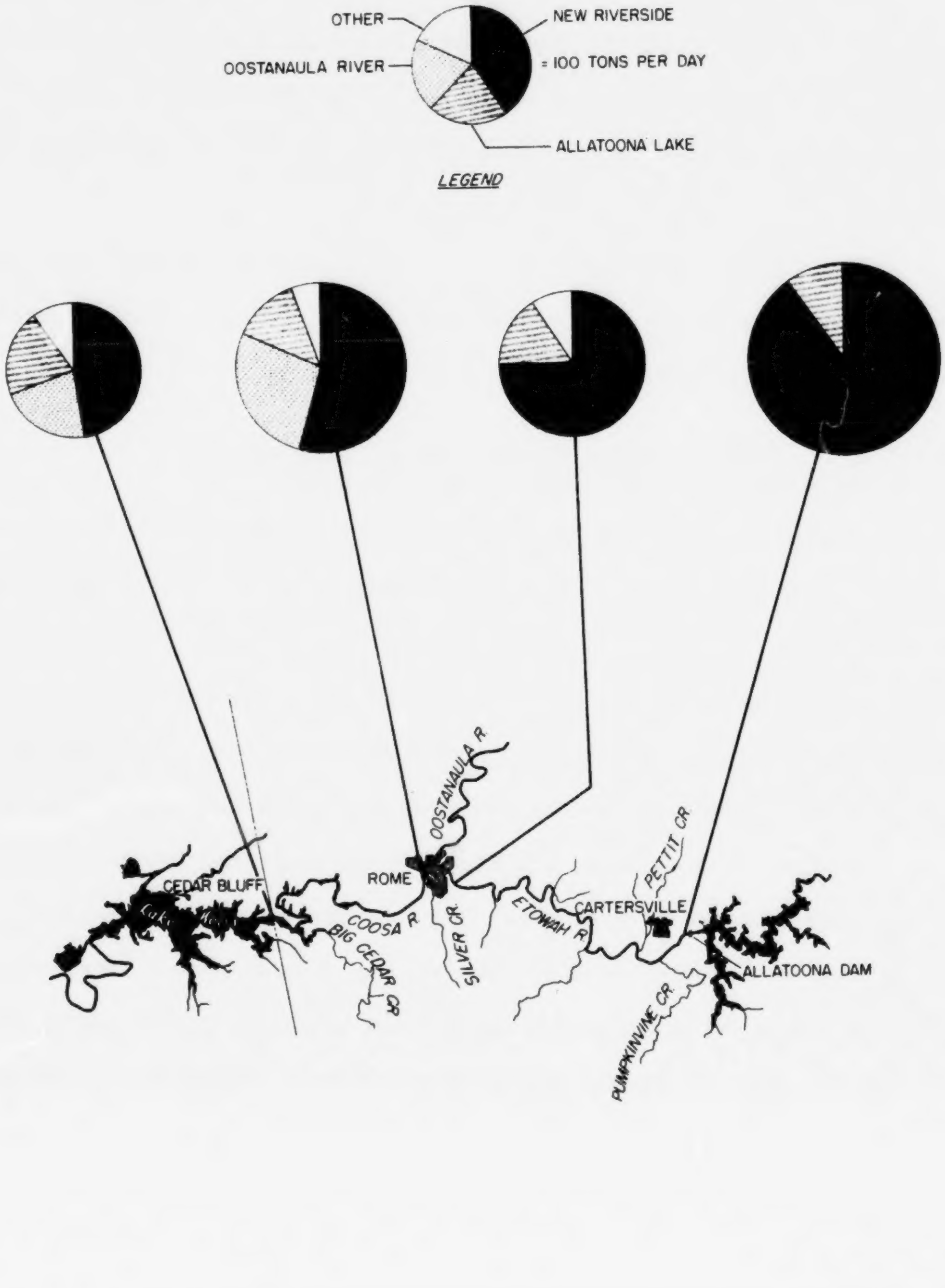
COOSA RIVER SYSTEM, GEORGIA-ALABAMA

ETOWAH, OOSTANAULA AND COOSA RIVERS

SOURCES OF SUSPENDED SEDIMENT

AUGUST 1962

FIGURE 21



the solids from Allatoona Lake represented 17 per cent of the total, and natural soil erosion contributed 8.5 per cent. The remaining 74.5 per cent of the solids in the Etowah River at Rome came from New Riverside Ochre Company.

The sum of the Etowah and Oostanaula rivers sediment loads amounted to 454 tons per day. Of this, 12.3 per cent came from Allatoona Lake, 6 per cent from soil erosion to the Etowah River, and 27.7 per cent from the Oostanaula River. The remaining 54 per cent came from New Riverside Ochre Company.

At the state line, the total suspended sediment loading approximated 257 tons per day. Assuming that the total 56 tons from Allatoona Reservoir persisted to this point, 23 per cent of the load came from the Oostanaula River, 22 per cent from the Allatoona Reservoir, and 10 per cent from other sources. The other sources include Big Cedar Creek, the residual from the Rome Kraft wastes, and soil erosion to the Etowah River. The remaining 45 per cent of the total sediment load crossing the state line during August is attributable to waste discharged by the New Riverside Ochre Company.

This study revealed that during August almost 1/2 of the turbidity and suspended solids of the Coosa River at the state line and in upper Lake Weiss were discharged to the Etowah River by the New Riverside Ochre Company in Cartersville.

Turbidity data furnished by the Rome, Georgia City Water Department indicates that during August and September 1961 considerably more than half of the turbidity in the Coosa River at, and below the state line, originated from mineral waste discharges into the Etowah River.

These unnatural off-color mineral waste suspensions degrade the physical appearance, reduce the aesthetic appeal, and interfere with full enjoyment of the recreation potential of the Coosa River and upper Lake Weiss.

SUMMARY AND CONCLUSIONS

A. Scope of Surveys, Discussions, Summaries, and Conclusions

1. The August 1962 stream surveys were conducted primarily to evaluate interstate pollution of the Coosa River System.
2. Local pollution problems requiring correction also were observed during the course of this study. These intrastate problems are under investigation by the Georgia Department of Public Health, which has direct responsibility for controlling pollution of waters in the State of Georgia.
3. The observed local intrastate effects of pollution were recorded and discussed in the body of this report. Except where they relate to interstate pollution, these local effects are not included in the following summaries and conclusions.

B. Chattooga River - Organic and Bacterial Pollution

1. Chattooga River waters were contaminated by raw sewage discharges from the communities of Trion and Summerville, Georgia.
2. The amount of contamination in the Chattooga River near the state line, as shown by the August 1962 coliform bacterial concentrations, is summarized as follows:
    a. Two miles above the state line the coliform content ranged

    from 1,700 to 22,000 for an average of 7,400 MPN/100 ml.

  b. Three miles below the state line the coliform content ranged from 800 to 35,000 for an average of 6,000 MPN/100 ml.

3. Contamination entering the river in Georgia increased the coliform bacterial content of the Chattooga River in Georgia and Alabama to levels considered unsatisfactory for water-contact recreation.
4. Chattooga River waters were polluted by sewage and industrial wastes from Trion and Summerville, particularly from the Riegel Textile plant in Trion.
5. This pollution reduced the dissolved oxygen concentration of the Chattooga River to zero near Summerville.
6. Approximately one-half of the samples collected 2 miles above and 9 miles below the state line contained less than the 4.0 mg/l minimum dissolved oxygen required of the Alabama Water Improvement Commission.
7. Dye wastes from the Riegel Textile plant produced unnatural, aesthetically offensive off-color blues, blacks and greens in the Georgia reach of the Chattooga River.
8. Pollution discharged to the Chattooga River in Georgia has killed fish in Georgia and Alabama. One major fish kill occurred in November 1961 and another in June 1962. Pollution remains a major threat to fish life in the Chattooga River.

C. Coosa River - Organic and Bacterial Pollution

1. Coosa River waters were contaminated by raw sewage discharges from Rome, Georgia.
2. The amount of contamination in the Coosa River near the state line, as shown by the August 1962 coliform bacterial concentration, is summarized as follows:
    a. Four miles above the state line, the coliform content ranged from 900 to 24,000 for an average of 6,400 MPN/100 ml.
    b. At the state line, the coliform content ranged from 1,300 to 10,900 for an average of 3,500 MPN/100 ml.
    c. Five miles below the state line the coliform content ranged from 700 to 13,000 for an average of 2,400 MPN/100 ml.
3. Contamination entering the river in Georgia increased the coliform bacterial content of the Coosa River in Georgia and Alabama to levels considered unsatisfactory for water-contact recreation.
4. The Coosa River and tributaries were polluted by sewage and industrial wastes from the Pepperell Manufacturing Company at Lindale, and associated industries, and particularly by the Rome Kraft paper mill west of Rome.
5. Pollution reduced the dissolved oxygen concentration of the Coosa River at the state line to a minimum of 1.9 mg/l.
6. Approximately one-third of the samples collected at the state line and one-half of the samples collected at stations 1-1/2 and 5 miles below the state line contained less than the 4.0 mg/l

minimum dissolved oxygen standard of the Alabama Water Improvement Commission.

7. Pollution of the Coosa River during August 1962 periodically reduced the water quality and the fish and aquatic life environment to critical levels above, at, and below the Georgia-Alabama State Line.

D. Silt Pollution

1. The Etowah and Coosa Rivers were polluted by silt and clay from mineral washing waste discharges.
2. During the August 1962 survey period, the turbidity and suspended sediment load of the Etowah River at Rome, Georgia, were considerably reduced below the levels experienced during the previous August and September 1961 season.
3. Results of the August 1962 special round-the-clock suspended sediment load studies are summarized as follows:
    a. Mineral washing wastes from the Thompson Weinman Paga Mines were settled in waste holding ponds. These ponds were supervised diligently during the survey period and the solids removal efficiencies were excellent. The effluent contained 0.14 tons of solids per day. This illustrates that mineral washing waste pollution can be effectively eliminated by adequately sized and properly operated waste settling ponds.
    b. Mineral washing wastes from the New Riverside Ochre Company plant were collected in a small waste holding pond and then

sluiced to the Etowah River at the end of each workday. These wastes contained approximately 500 tons of solids per day.

   c. Waste solids, discharged by the New Riverside Ochre Company, formed 90 per cent of the Etowah River suspended sediment load at Cartersville and 45 per cent of the Coosa River load at the Georgia-Alabama State Line.

4. Silt deposits over the river bottom in upper Lake Weiss reach a maximum observed depth of 10-1/2 inches 5 miles below the state line.
5. The bottom organism and algae, normally serving as fish food, were seriously degraded by the silt load in the Etowah and Coosa Rivers.
6. The unnatural off-color mineral waste suspensions degraded the physical appearance, reduced the aesthetic appeal and interfered with full enjoyment of the recreation potential of the Coosa River and upper Lake Weiss.

E. Conclusions

1. Wastes entering the Chattooga River from Trion, the Riegel Textile Corporation of Trion, and Summerville and associated industries, and wastes entering the Coosa River and tributaries from the New Riverside Ochre Company of Cartersville, the Pepperell Manufacturing Company of Lindale, Rome and associated industries, and Rome Kraft Company in Georgia endangers the health and welfare of persons in Alabama.
2. This pollution of interstate waters is subject to abatement under the Federal Water Pollution Control Act.

APPENDIX

TABLES A-1 to A-22

FIGURES A-1 to A-4

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

LOCATION GUIDE

TABLE NO. A-1

Sampling Station and Reference Point Locations

STATION NO.	RIVER MILEAGE	DESCRIPTION
CHATTOOGA RIVER (Including Lake Weiss)		
CH-9	CH-48.85	Chattooga River bridge, 3 miles above, and N. W. of Trion.
CH-8B	CH-45.85	Chattooga River bridge, 0.1 miles above Riegel Mills in Trion.
R-1	CHR-45.75	Riegel Textile Corp. outfall by old U.S. No. 27 in Trion.
CH-8A	CH-44.65	Chattooga River bridge, 1.0 miles below Trion on U.S. No. 27. (South side of river channel).
CH-8	CH-42.4	Chattooga River bridge below Trion and 5/8 mile E. of U.S. No. 27.
CH-7	CH-39.6	Chattooga River near Summerville, north City limits.
CH-6	CH-37.8	Chattooga River bridge on U.S. No. 27, 1 mile above the Summerville outfall.
-	CH-37.7	U.S.G.S. gaging Station 2-3980.
-	CH-36.85	Summerville sewer outfall.
CH-5	CH-34.8	Chattooga River bridge on Holland Road below the Summerville outfall, 1 mile E. of Georgia No. 114.
RC-1	CHRC-32.8-1.0	Raccoon Creek bridge on Georgia No. 114 near Berryton.
CH-4	CH-28.8	Chattooga River bridge on S2201, 0.5 miles S. of Lyerly and 0.75 miles from Georgia No. 114.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

LOCATION GUIDE

TABLE NO. A-1

Sampling Station and Reference Point Locations
(continued)

STATION NO.	RIVER MILEAGE	DESCRIPTION
CHATTOOGA RIVER (Including Lake Weiss) - Continued		
CH-3 =1-CH	CH-23.6	Chattooga River bridge on S1363, 2 miles above the State Line and 0.75 miles S. of Chattoogaville and Georgia No. 114.
-	CH-21.6	GEORGIA-ALABAMA STATE LINE.
CH-2 =2-CH	CH-18.4	Chattooga River bridge, 3 river miles below the State Line, and 0.3 miles S.E. of Alabama No. 68. ALSO U.S.G.S. GAGING STATION 2-3983.
CH-1 =3-CH	CH-12.4	Chattooga River, Gaylesville area, bridge on Alabama No. 35.
4-CH	CH- 8.9	Chattooga River bridge on Alabama No. 68, N. of Cedar Bluff.
5-CH	CH- 5.5	Chattooga River, N.E. of Cedar Bluff.
ETOWAH RIVER		
E-9	E-77.97	Etowah River, Canton area, bridge on Georgia No. 5. ALSO U.S.G.S. GAGING STATION 2-3920.
-	E-48.0	Allatoona Dam.
E-8	E-47.3	Etowah River, 0.7 miles below Allatoona Dam.
-	E-47.0	U.S.G.S. GAGING STATION 2-3940.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

LOCATION GUIDE

TABLE NO. A-1

Sampling Station and Reference Point Locations
(continued)

STATION NO.	RIVER MILEAGE	DESCRIPTION
ETOWAH RIVER - Continued		
NR-1	ENR-46.3	New Riverside Ochre Company outfall.
E-7	E-44.5	Etowah River bridge on Georgia No. 3, N.W. of Emerson.
-	E-40.8	CARTERSVILLE SEWER OUTFALL AND SEWER FROM CHEMICAL PRODUCTS CORPORATION.
TW-1	ETW-40.8	Thompson Weinman Company outfall.
PU-1	EPU-40.2-1.0	Pumpkinvine Creek bridge W. of Emerson. (Below Haney-Mosteller waste pond).
PU-2	EPU-40.2-4.0	Pumpkinvine Creek bridge S. of Emerson. (Above Haney-Mosteller waste pond).
E-6	E-39.0	Etowah River bridge S. of Cartersville.
-	E-38.2	U.S.G.S. GAGING STATION.
PE-1	EPE-37.0-1.0	Pettit Creek bridge on Georgia No. 61, S.W. of Cartersville. (Below Cartersville City sanitary sewers).
E-5	E-30.4	Etowah River, Euharlee area, bridge, 1 mile from S831.
EU-1	EEU-29.9-0.5	Euharlee Creek bridge, S.E. of Euharlee.
E-4	E-26.2	Etowah River bridge on S829, 2 miles S. of new U.S. No. 411.
E-3	E-21.4	Etowah River bridge on new U.S. No. 411, S.W. of Kingston. ALSO U.S.G.S. GAGING STATION.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

LOCATION GUIDE

TABLE NO. **A-1**

Sampling Station and Reference Point Locations
(continued)

STATION NO.	RIVER MILEAGE	DESCRIPTION
ETOWAH RIVER - Continued		
TR-1	ETR-20.4-1.0	Two Run Creek bridge, S.W. of Kingston.
CO-1	ECO-20.1-1.5	Connesena Creek bridge, S.W. of Kingston.
SP-1	ESP-19.9-0.5	Spring Creek bridge on new U.S. No. 411.
E-2	E- 6.4	Etowah River at Freeman's Ferry, 2 miles from new U.S. No. 411.
S1-1	ES1- 0.4-2.2	Silver Creek bridge below Lindale.
E-1	E- 0.14	Etowah River at Broad Street bridge in Rome, Georgia.
-	E- 2.0	U.S.G.S. GAGING STATION 2-3960.
-	E- 0.0 =C-282.4 =O-0.0	Confluence of Etowah, Oostanaula, and Coosa Rivers in Rome, Georgia.
OOSTANAULA RIVER		
O-1	O-1.3	Oostanaula River, Rome area upstream, Rome water works intake.
-	O-4.6	U.S.G.S. GAGING STATION 2-3885.
COOSA RIVER (Including Lake Weiss)		
-	C-279.3	ROME CITY SEWER OUTFALL.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

LOCATION GUIDE

TABLE NO. A-1

Sampling Station and Reference Point Locations
(continued)

STATION NO.	RIVER MILEAGE	DESCRIPTION
COOSA RIVER (Including Lake Weiss) - Continued		
C-1	C-278.4	Coosa River, Rome area downstream at county work camp.
C-2	C-275.4	Coosa River, Rome area downstream at Mayo's Bar Lock and Dam.
C-3	C-268.5	Coosa River, 1 mile above Rome Kraft waste outfall diffuser.
-	CRK-267.4	Rome Kraft diffuser.
C-4	C-265.3	Coosa River, 2 miles below Rome Kraft waste outfall diffuser.
C-5	C-260.7	Coosa River at Morton Bend, 7 miles below Rome Kraft.
C-6	C-256.0	Coosa River, 3 miles above the State Line.
BC-1	CBC-255.8-0.3	Big Cedar Creek.
BC-2	CBC-255.8-6.5	Big Cedar Creek bridge on S1367.
-	CBC-255.8-20.0	U.S.G.S. GAGING STATION 2-3975.
-	C-252.9	GEORGIA-ALABAMA STATE LINE.
C-7 =-C	C-252.8	Coosa River, 0.15 miles below the State Line.
2-C	C-251.3	Coosa River approximately 1.6 miles below the State Line.
3-C	C-249.6	Coosa River approximately 3.3 miles below the State Line.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

LOCATION GUIDE

TABLE NO. A-1

Sampling Station and Reference Point Locations (continued)

STATION NO.	RIVER MILEAGE	DESCRIPTION
COOSA RIVER (Including Lake Weiss) - Continued		
C-8 =4-C	C-247.9	Coosa River at Poole's Ferry, approximately 5 miles below the State Line.
5-C	C-246.4	Coosa River approximately 6.5 miles below the State Line.
6-C	C-243.6	Coosa River approximately 9.3 miles below the State Line.
7-C	C-240.1	Coosa River, S. of Cedar Bluff, approximately 12.8 miles below the State Line.
8-C	C-236.1	Coosa River bridge on Alabama No. 9 at Cedar Bluff.
9-C	C-234.0	Coosa River approximately 2.0 miles W. of Cedar Bluff near confluence of old Chattooga and Coosa River channels.
10-C	C-231.0	Coosa River approximately 21.9 miles below the State Line.
1-LR	LR- 3.9	Little River arm of Lake Weiss.

NOTE: Stations in Lake Weiss are referenced according to river miles along the old river channels.

TABLE NO. A-2

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

RIVER CONDITIONS FOR AUGUST 2 - AUGUST 30, 1962

Including Paper Mill Production and B.O.D. Loads to the River

Data Provided by Rome Kraft Company of Rome, Georgia

River Survey Day	River Survey Date	Mill Production (Tons)	B.O.D. To River (#/Day)	River Flow (cfs)			D.O.'s at the Various Mile Points (Miles below Rome, Ga.)																	
				Avg.	High	Low	14	15¼	16.2	19	21	23	25	26	27[a]	28	29	30	31[b]	32	33	34	35	35[c]
T	8/2/62	1371.06	51,800	2551	3590	1740	6.7	6.6	6.6	4.7	4.1	4.8	5.1	5.3	3.6	3.5	4.1	4.2	5.3	6.5	7.5	7.1	7.3	8.0
F	3	1128.92	34,800	2517	3590	1600	6.9	7.5	7.0	4.0	3.5	5.0	4.6	3.9	2.8	2.8	3.5	4.3	4.6	5.2	5.7	5.7	6.3	5.3
S	4	1261.05	39,100	1904	2990	1600	6.8	7.3	7.3	4.0	3.6	4.5	3.9	2.5	2.6	3.2	3.6	4.4	5.1	4.4	4.3	4.2	3.8	4.1
Sunday	5	1293.62	40,400	1517	1600	1475	7.4	4.8	6.3	5.9	5.6	6.0	2.9	2.9	3.5	5.0	5.4	6.0	5.7	5.4	6.9	6.9	6.5	8.9
M	6	1249.13	37,900	2427	4600	1475	6.5	5.2	6.2	6.2	6.7	6.4	5.8	6.2	6.2	6.2	7.3	7.4	7.5	7.5	6.5	7.0	8.5	8.3
T	7	1353.91	59,700	3533	4990	2090	6.7	6.8	6.4	5.0	3.5	3.6	4.6	4.6	4.0	3.6	3.5	5.0	7.5	8.2	7.5	7.7	7.8	8.0
W	8	1326.07	34,800	3755	5120	2480	7.0	7.1	6.4	6.1	4.3	3.8	4.1	4.4	4.3	4.2	4.0	3.4	3.2	3.2	4.0	3.8	4.5	4.7
T	9	1303.73	46,400	4041	5400	2750	6.5	7.0	6.3	6.1	5.5	4.2	4.2	4.5	4.7	4.7	5.1	4.9	4.2	3.7	3.9	4.1	4.2	6.3
F	10	1349.58	51,800	3852	5120	2480	6.2	6.4	6.2	6.3	5.7	4.9	4.2	5.9	4.7	5.0	5.0	5.3	4.9	4.8	5.3	5.6	6.3	6.3
S	11	1370.74	44,600	2659	4600	1600	6.3	7.1	6.7	6.6	5.5	4.9	4.5	4.4	4.7	5.0	5.0	5.1	4.7	4.4	4.5	4.1	4.5	7.1
Sunday	12	1426.12	26,800	1543	1600	1475	6.9	6.9	7.0	6.4	4.5	5.0	5.2	5.8	5.6	4.6	4.9	4.8	4.6	4.9	5.0	6.5	6.7	7.9
M	13	1367.86	48,100	2664	5540	1370	5.9	5.3	5.7	6.1	5.9	6.5	5.4	6.8	5.0	6.7	7.6	7.7	7.3	6.6	7.0	7.6	6.2	6.4
T	14	1289.98	70,900	3704	5680	1970	5.8	5.9	5.5	5.0	2.7	2.0	3.1	3.5	3.8	4.0	4.1	4.0	4.0	4.3	5.2	5.0	4.7	7.9
W	15	1259.40	73,200	3758	5680	1970	6.1	5.8	5.7	5.6	4.2	2.3	2.7	3.6	3.9	4.3	4.2	3.8	3.8	2.7	-	-	-	-
T	16	1307.75	55,500	3664	5540	1740	5.8	6.5	5.8	6.0	4.7	3.0	3.5	3.9	4.0	4.0	4.1	4.0	3.2	2.5	2.1	2.8	2.7	6.0
F	17 A.M.	1263.54	56,500	3625	5540	1740	5.9	5.9	5.6	5.8	4.8	3.9	3.7	3.9	4.1	4.2	4.5	4.2	3.5	3.2	3.0	3.1	4.0	4.8
F	17 P.M.	-	-	-	-	-	6.9	6.3	5.9	5.5	5.3	4.8	4.5	3.9	3.8	4.3	4.4	4.6	4.4	5.9	5.5	5.3	5.1	5.0
S	18	1166.04	30,200	2416	4860	1370	5.7	6.0	5.6	5.8	4.7	4.1	3.5	3.7	4.0	4.2	4.5	4.0	4.2	4.0	4.1	4.1	4.0	7.7
Sunday	19	1486.75	9,400	1299	1370	1270	6.8	5.3	6.5	6.1	4.5	4.5	4.6	4.6	4.4	3.6	5.0	4.3	4.8	5.6	5.7	7.9	6.7	8.4
M	20	1331.43	17,200	1990	4080	1270	6.0	5.1	5.6	5.5	6.2	6.3	6.2	5.7	5.5	5.6	7.6	7.7	8.0	7.7	8.1	8.5	8.5	8.0
T	21	1535.27	42,700	2749	4080	1475	6.4	6.5	6.0	5.6	4.8	4.2	4.7	4.5	4.7	4.3	4.6	5.2	6.0	7.4	8.3	3.4	3.2	7.7
W	22	1380.07	32,500	2838	4470	1600	6.5	6.8	6.7	5.5	4.0	4.5	3.7	3.6	3.4	3.0	3.1	3.7	4.2	4.4	4.6	4.8	5.0	5.7
T	23	1411.94	33,600	3008	4340	1740	6.7	7.0	6.8	5.0	3.8	4.8	5.5	5.0	4.5	3.8	3.8	3.8	4.4	4.4	4.3	4.1	3.9	4.5
F	24	1377.57	31,100	2754	4210	1475	6.7	6.6	6.6	6.1	4.0	4.7	5.3	5.2	4.5	3.6	3.6	3.3	3.9	4.6	4.6	3.9	3.5	3.7
S	25	1436.60	9,000	1924	3710	1270	6.3	6.9	6.9	5.3	4.1	5.0	5.4	5.3	4.5	3.7	3.6	4.0	4.5	5.0	4.6	3.9	3.8	4.1
Sunday	26	1336.72	35,900	1270	1270	1270	7.2	5.1	6.3	6.0	5.7	5.8	4.0	4.3	4.4	5.0	5.6	5.8	6.6	6.6	-	-	-	7.1
M	27	1049.48	28,200	1756	3840	1270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T	28	681.28	39,900	2379	3710	1270	6.2	6.0	5.7	4.5	4.5	4.2	4.7	4.8	4.7	5.2	5.5	6.7	7.5	6.8	7.4	9.6	8.2	9.0
W	29	1149.52	56,700	2430	3710	1270	6.9	7.1	6.7	5.1	3.8	4.5	5.4	4.7	4.8	4.7	5.3	6.1	7.3	8.3	8.6	8.7	9.7	10.1
T	30	1383.95	37,000	2341	3710	1170	7.3	7.0	6.6	4.4	3.8	5.2	4.1	3.7	3.6	3.5	4.8	4.4	4.7	5.2	5.4	6.6	5.9	7.0
MAXIMUM		1535.27	73,200	4041	5680	2750	7.4	7.5	7.3	6.6	6.7	6.5	6.2	6.8	6.2	6.7	7.6	7.7	8.0	8.3	8.6	9.6	9.7	10.1
MINIMUM		681.28	9,000	1270	1270	1170	5.7	4.8	5.6	4.0	2.7	2.0	2.7	2.5	2.6	2.3	3.1	3.3	3.2	2.5	2.1	2.8	2.7	3.7
AVERAGE		1298.24	40,500	2651	4088	1630	6.5	6.3	6.3	5.5	4.6	4.6	4.5	4.5	4.2	4.3	4.7	4.9	5.2	5.3	5.5	5.8	5.8	6.7

a. Above Big Cedar Creek
b. At State Line
c. At Poole's Ferry

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

CHATTOOGA RIVER TABLE NO. A-3

Summary PHS Survey Data - August 1962

River Mile		Temp. °C	pH	B.O.D. mg/l	D.O. mg/l	% Sat.	Coliform MPN/100 ml	Color
MAIN STEM								
CH-48.85	Max.	26	7.6	2.7	8.3	101	24,000	25
	Min.	21	6.8	0.7	5.3	62	2,200	10
	Avg.	23	7.1	2.1	6.6	77	7,856	15.1
CH-45.85	Max.	24	7.6	4.1	9.4	108	17,000	15
	Min.	20	6.8	1.1	8.2	92	2,100	9
	Avg.	22	7.2	2.2	8.6	97	5,032	11.1
CH-44.65	Max.	26	10.0	49.2	6.7	82	92,000	80
	Min.	22	9.3	30.5	4.0	46	2,100	30
	Avg.	23	9.7	38.6	4.9	57	19,001	56.8
CH-42.4	Max.	25	10.0	36.5	5.2	58	54,200	50
	Min.	21	6.8	3.2	1.5	18	130	9
	Avg.	22	9.0	20.2	2.4	28	11,736	32.6
CH-39.6	Max.	27	9.8	32.2	5.9	67	240,000	50
	Min.	22	7.9	1.8	0.0	0	330	11
	Avg.	26	9.0	17.8	1.1	12	9,288	29.3
CH-37.8	Max.	26	9.5	34.7	6.0	69	240,000	95
	Min.	22	6.8	2.5	0.0	0	130	10
	Avg.	24	8.9	17.8	1.0	12	20,422	34.4
CH-34.8	Max.	27	9.6	21.0	6.7	77	2,400,000	40
	Min.	21	7.0	2.7	0.0	0	11,000	11
	Avg.	23	8.7	11.6	1.3	16	184,833	24.4
CH-28.8	Max.	27	9.2	9.8	6.3	73	24,000	29
	Min.	22	6.7	2.3	0.7	26	230	11
	Avg.	24	8.2	5.8	3.2	36	5,658	19.1
CH-23.6	Max.	26	8.9	7.7	5.6	65	22,000	30
	Min.	22	6.6	2.8	2.0	23	1,700	13
	Avg.	24	8.0	4.9	3.4	40	7,444	18.9
CH-18.4	Max.	27	8.4	8.4	6.2	70	34,800	20
	Min.	22	6.8	1.6	3.6	44	790	11
	Avg.	24	7.8	3.0	4.5	54	5,970	16.4
CH-12.4	Max.	28	8.1	10.8	9.0	110	4,900	22
	Min.	23	7.2	2.1	2.6	30	330	9
	Avg.	25	7.6	3.5	5.1	62	1,812	14.6
TRIBUTARY								
CHRC-32.8-1.0	Max.	24	8.2	1.6	9.3	106	54,200	20
	Min.	20	6.8	0.6	6.0	85	3,300	6
	Avg.	22	7.3	1.2	8.4	96	12,100	9.4
INDUSTRIAL WASTE								
CHR-45.75	Max.	30	11.4	>565	10.0	115	92,000	700
	Min.	20	6.0	324	0.0	0	20	160
	Avg.	26	10.2	-	-	-	-	-

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TABLE NO. A-4

CHATTOOGA RIVER

Summary Alabama Survey Data - August 1962

River Mile		Temp. °C	pH	B.O.D. mg/l	D.O. mg/l	% Sat.	Turb. Units
	MAIN STEM						
CH-23.6	Max.	26	9.2	6.7	7.8	95	24
	Min.	24	7.4	1.2	1.7	20	8
	Avg.	25	8.6	3.2	4.2	50	17
CH-18.4	Max.	26	9.1	5.4	8.2	98	65
	Min.	23	7.4	0.5	3.1	37	15
	Avg.	25	8.4	2.3	4.7	56	23
CH-12.4	Max.	31	8.9	6.5	8.4	100	85
	Min.	24	7.6	1.1	2.1	26	15
	Avg.	26	8.4	2.2	4.1	49	27
CH-8.9	Max.	31	8.5	5.6	9.5	127	25
	Min.	28	7.2	1.2	2.3	30	13
	Avg.	29	8.1	3.2	7.0	90	21
CH-5.5	Max.	30	8.3	4.2	9.9	112	18
	Min.	28	7.6	1.3	5.7	72	8
	Avg.	29	7.8	2.5	7.3	91	13

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

ETOWAH RIVER

TABLE NO. A-5

Summary PHS General Survey Data - August 1962

River Mile		Temp. °C	pH	B.O.D. mg/l	D.O. mg/l	% Sat.	Coliform MPN/100 ml	Turb.	Color
MAIN STEM									
E-47.3	Max.	23	6.6	3.8	2.0	23	1,300	14	45
	Min.	21	6.4	3.5	1.6	18	790	6	7
	Avg.	21.8	6.4	3.6	1.7	20	1,045	11	25
E-44.5	Max.	24.5	6.8	-	3.4	40	-	330	20
	Min.	21	6.3	-	2.3	28	-	10	8
	Avg.	22	6.5	2.0	2.8	33	1,090	125	15
E-39.0	Max.	23.5	7.2	7.0	6.4	73	4,900	365	23
	Min.	21	6.6	4.2	5.1	59	3,100	6	12
	Avg.	22.3	6.8	5.6	5.7	66	4,000	106	17
E-30.4	Max.	25.5	7.2	3.6	7.3	83	13,000	30	28
	Min.	21.5	7.0	1.7	6.3	71	12,000	10	13
	Avg.	22.5	7.1	2.7	6.7	77	12,500	14	19
E-26.2	Max.	25	7.4	2.6	8.1	95	3,300	32	25
	Min.	21.8	7.0	2.2	6.8	77	3,100	7	10
	Avg.	22.7	7.3	2.4	7.4	85	3,200	15	17
E-21.4	Max.	25.5	8.2	4.0	8.9	95	9,400	26	30
	Min.	21	7.0	2.8	7.0	78	2,200	7	11
	Avg.	22.8	7.3	3.4	7.8	88	5,800	16	20
E-6.4	Max.	26	7.5	5.7	9.8	117	17,200	56	30
	Min.	21.5	6.8	1.4	7.3	85	490	9	11
	Avg.	24	7.2	3.9	8.0	94	7,298	24	24
TRIBUTARIES									
EPU-40.2-1.0	Max.	24.5	7.4	2.0	8.2	95	10,900	36	30
	Min.	21.5	7.1	1.4	7.6	88	4,900	8	14
	Avg.	23.2	7.2	1.7	7.9	92	7,900	18	17
EPU-40.2-4.0	Max.	26	7.4	-	7.7	92	-	29	30
	Min.	22	7.0	-	7.6	89	-	9	15
	Avg.	24	7.2	-	7.6	90	-	14	19
EPE-37.0-1.0	Max.	24	7.5	23.0	5.1	58	10,900,000	460	75
	Min.	21.5	7.2	20.7	4.2	49	700,000	12	11
	Avg.	22.8	7.4	21.9	4.6	54	5,800,000	85	37
EEU-29.9-0.5	Max.	21.5	7.8	2.2	7.8	88	33,000	126	27
	Min.	20	7.3	1.6	7.6	83	7,000	11	8
	Avg.	20.9	7.5	1.9	7.7	85	20,000	30	11
ETR-20.4-1.0	Max.	22	7.9	-	-	-	-	38	15
	Min.	21.5	7.8	-	-	-	-	16	12
	Avg.	21.6	7.8	-	-	-	-	27	14
ECO-20.1-1.5	Max.	24	7.8	-	8.8	96	-	250	27
	Min.	20	7.4	-	8.6	96	-	6	6
	Avg.	20.9	7.5	-	8.7	96	-	38	10
ESP-19.9-0.5	Max.	22.5	8.2	-	8.8	100	-	17	14
	Min.	20	7.4	-	8.2	90	-	4	6
	Avg.	20.9	7.6	1.0	8.5	95	3,300	8	9
ESI-0.4-2.2	Max.	28.5	7.8	14.1	4.8	60	490,000	61	35
	Min.	21.5	6.9	4.3	0.7	8	31,000	9	8
	Avg.	26	7.5	9.1	2.7	33	124,357	16	16
MINERAL WASHING POND DISCHARGES									
ENR-46.3	Max.	24.5	-	-	-	-	-	26,000	12
	Min.	21.5	-	-	-	-	-	2,850	9
	Avg.	22.5	6.9	-	-	-	-	8,862	10
ETW-40.8	Max.	34	7.0	-	-	-	-	105	75
	Min.	27	6.2	-	-	-	-	4	4
	Avg.	29.9	6.5	-	-	-	-	27	17
ETW-40.8	Max.	31	6.8	-	-	-	-	325	250
	Min.	25	6.1	-	-	-	-	30	10
	Avg.	27.6	6.6	-	-	-	-	107	78

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

COOSA RIVER

TABLE NO. A 6

Summary PHS General Survey Data - August 1962

River Mile		Temp. °C	pH	B.O.D. mg/1	D.O. mg/1	% Sat.	Coliform MPN/100 ml	Turb.	Color
HEAD WATERS									
E-6.4	Max.	26	7.5	5.7	9.8	117	17,200	56	30
	Min.	21.5	6.8	1.4	7.3	85	490	9	11
	Avg.	24	7.2	3.9	8.0	94	7,298	24	24
ESI-0.4-2.2	Max.	28.5	7.8	14.1	4.8	60	490,000	61	35
	Min.	21.5	6.9	4.3	0.7	8	31,000	9	8
	Avg.	26	7.5	9.1	2.7	33	124,357	16	16
O-1.3	Max.	28.5	7.3	2.8	7.4	87	54,000	86	32
	Min.	22.5	7.1	1.3	6.1	71	2,200	54	9
	Avg.	24.9	7.3	2.0	6.4	77	11,079	71	18
MAIN STEM									
C-278.4	Max.	24.5	7.4	3.5	7.3	83	700,000	65	40
	Min.	21	6.9	1.5	6.3	72	33,000	29	13
	Avg.	23	7.2	2.5	6.7	77	149,250	43	24
C-275.4	Max.	25	7.3	4.2	7.6	87	230,000	75	30
	Min.	21.5	6.9	1.3	6.4	73	22,000	33	13
	Avg.	23	7.1	2.4	6.9	80	99,000	49	24
C-268.5	Max.	25	7.5	4.7	7.4	88	350,000	57	32
	Min.	23	6.6	1.3	6.0	70	17,200	38	15
	Avg.	23.9	7.1	2.4	6.6	77	111,700	46	22
C-265.3	Max.	26	7.3	7.0	6.6	78	130,000	65	45
	Min.	23	6.8	2.9	4.9	53	4,900	39	24
	Avg.	24.8	7.0	4.0	5.3	69	49,154	51	35
C-260.7	Max.	27.5	7.2	3.7	5.9	72	33,000	63	46
	Min.	23	6.8	1.2	3.9	52	4,900	43	21
	Avg.	25	7.0	2.5	5.3	63	21,715	50	33
C-256.0	Max.	26	7.3	3.0	5.1	61	24,000	70	43
	Min.	23	6.0	1.0	1.8	22	940	30	24
	Avg.	25.1	7.0	1.8	3.6	44	6,405	50	35
C-252.8	Max.	27	7.3	3.4	6.2	60	10,900	52	39
	Min.	24	6.3	1.0	1.9	23	1,300	24	24
	Avg.	25.7	6.9	1.8	3.7	45	3,494	39	32
C-247.9	Max.	27	7.2	3.1	4.8	60	13,000	58	43
	Min.	25	6.1	1.2	3.0	37	700	26	25
	Avg.	25.8	7.0	2.1	3.6	45	2,377	41	34
TRIBUTARIES									
CBC-255.8-0.3	Max.	28	7.2	4.0	7.5	95	3,300	112	35
	Min.	25	6.0	1.6	2.9	35	490	31	23
	Avg.	25.9	6.9	2.2	4.2	52	1,630	54	32
CBC-255.8-6.5	Max.	23	7.4	4.2	8.5	96	54,200	28	17
	Min.	20.5	6.2	1.0	7.8	86	3,300	8	10
	Avg.	21.7	7.0	2.3	8.2	92	1,688	14	14

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TABLE NO. A-7

COOSA RIVER

Summary Alabama Survey Data - August 1962

River Mile		Temp. °C	pH	B.O.D. mg/l	D.O. mg/l	% Sat.	Turb. Units
MAIN STEM							
C-252.8	Max.	31	7.9	4.2	10.2	134	48
	Min.	26	7.0	0.4	1.9	24	25
	Avg.	28	7.3	1.8	4.6	54	32
C-251.3	Max.	30	7.5	3.7	6.0	79	39
	Min.	27	6.9	0.4	1.9	24	21
	Avg.	28	7.2	1.8	4.3	54	30
C-249.6	Max.	30	7.5	4.9	8.9	117	47
	Min.	27	7.0	0.8	2.6	33	19
	Avg.	28	7.2	2.0	4.7	59	31
C-247.9	Max.	30	7.8	4.9	9.5	124	45
	Min.	27	7.0	0.1	3.0	38	17
	Avg.	28	7.3	1.9	5.1	64	30
C-246.4	Max.	31	7.9	5.9	10.1	135	40
	Min.	27	7.1	0.1	3.5	44	20
	Avg.	28	7.4	2.3	5.8	74	29
C-243.6	Max.	30	7.7	4.5	8.4	108	29
	Min.	27	7.1	0.0	2.8	35	20
	Avg.	28	7.4	2.1	6.0	76	25
C-240.1	Max.	29	8.2	3.2	8.1	104	27
	Min.	27	7.1	0.5	3.3	42	13
	Avg.	28	7.4	2.0	6.0	76	21
C-236.1	Max.	31	7.9	4.0	9.4	121	27
	Min.	27	7.2	0.4	5.0	63	12
	Avg.	29	7.6	2.0	7.1	90	19
C-234.0	Max.	31	8.0	4.0	9.8	131	23
	Min.	28	7.1	0.6	4.7	59	10
	Avg.	29	7.5	2.0	6.9	89	15
C-231.0	Max.	30	8.3	3.9	9.7	129	26
	Min.	28	7.5	1.1	5.6	71	9
	Avg.	28	7.8	2.3	7.6	96	13
TRIBUTARY							
LR-3.9	Max.	31	8.4	3.8	10.0	133	19
	Min.	27	7.1	1.7	6.4	81	10
	Avg.	29	7.8	2.7	7.9	101	15

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

ALGAL COUNTS IN NUMBER PER ML.

TABLE NO. A-8

				Number per ml.				
River Miles	Day of Week	Time	Algal Genera*	Flagellate Algae	Green Algae	Blue-Green Algae	Diatoms	Total
				ETOWAH RIVER				
329.6	Sat.	10:15 AM	5		147	380	168	653
303.8	Sat.	11:30 AM	2	42	42		42	126
288.8	Wed.	9:00 AM	0				422	422
				OOSTANAULA RIVER (282.4)				
1.3	Wed.	11:00 AM	10	295	1,730	168	3,882	6,075
				COOSA RIVER				
278.5	Wed.	2:00 PM	8	126	653		1,857	2,636
265.3	Thur.	9:30 AM	2		41	41	456	538
252.8	Thur.	1:40 PM	12	337	1,646	780	2,026	4,789
247.9	Fri.	4:00 PM	9	94	476		539	1,109
239.4	Fri.	1:45 PM	9	641	538		7,204	8,383

* Excluding Diatoms

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

DEPTH (inches) OF REMAINING INCIDENT LIGHT

TABLE NO. A-9

River Miles	Day of Week	Time	% of Remaining Light				
			25%	10%	5%	2.5%	1%
ETOWAH RIVER							
E-47.3	SAT.	10:15 AM	23	60[1]	86[2]	115[2]	151[2]
E- 6.4	WED.	9:00 AM	4	10	15	20	26
OOSTANAULA RIVER							
1.3	WED.	11:00 AM	11	19	24	30	37
COOSA RIVER							
278.5	WED.	2:00 PM	5	12	17	23	30
265.3	THURS.	9:30 AM	6	13	18	24	31
252.8	THURS.	1:40 PM	10	19	28	37	48
247.9	FRI.	4:00 PM	6[3]	16	23	30	39
239.4	FRI.	1:45 PM	12	26	38	49	65
CHATTOOGA RIVER							
CH-10	FRI.	11:00 AM	10	22	31	41	53

1. Bottom

2. Theoretical Calculation

3. Strong Wind

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

PRE-IMPOUNDMENT FISH POPULATION SUMMARY[1]

TABLE NO. A-10

	Coosa River				Chattooga River	
	Above Sewell Ferry (7-18-58)		Below Sewell Ferry (7-18-58)		4 Mi. Below Georgia Line (10-29-58)	
	No.	E*	No.	E	No.	E
Blue Catfish, Over 12"	6					
Blue Catfish, Under 12"	3	9.3	3	0.1		
Channel Catfish, Over 10"	6		21		2	1.0
Channel Catfish, Under 10"	20	15.0	40	10.5		
Flathead Catfish, Over 12"			13		24	
Flathead Catfish, Under 12"	7	.2	6	8.1	8	22.6
Spotted Bass, Over 9"			8		24	
Spotted Bass, Under 9"	1	.4	6	3.6	18	23.9
Redeye Bass, Over 9"					8	
Redeye Bass, Under 9"					30	6.5
N. Rock Bass, Over 5"					18	
N. Rock Bass, Under 5"					12	3.9
Bluegill, Over 5"					14	
Bluegill, Under 5"			1		4	2.2
Yellowbelly Sunfish, Over 5"			2	0.2	14	
Yellowbelly Sunfish, Under 5"					28	1.5
Black Crappie, Over 8"			2	0.4		
Walleye, Over 11"			1	0.8		
Green Sunfish			1			
Spotted Suckers			2	1.5	14	1.8
Hog Suckers					20	1.0
River Redhorse	3	24.3	17	22.8		
Golden Redhorse					66	27.0
Blacktail Redhorse	19	30.0	97	32.8	18	7.7
Drum			11	6.8		
Buffalo			1	6.3		

PRE-IMPOUNDMENT FISH POPULATION SUMMARY[1]
(Continued)

	Coosa River				Chattooga River	
	Above Sewell Ferry (7-18-58)		Below Sewell Ferry (7-18-58)		4 Mi. Below Georgia Line (10-29-58)	
	No.	E*	No.	E	No.	E
Mooneye	41	15.9	18	1.7		
Gizzard Shad	15	3.2	15	3.3		
Carp Sucker			1			
Others	178	1.6	56		72	0.9

SUMMARY

Number of Fish Per Acre	299	322	376
Pounds of Fish Per Acre	56.0	227.2	147.2
% Adult Fish by Weight	74.9	89.3	80.7
% Adult Usable Fish (Food and Game)	21.3	20.0	55.0
% Game Species	0.4	5.0	38.2

---

[1] Annual Report, October 1, 1957 - September 30, 1958, Dept. of Conservation, State of Alabama, pp. 124, 134, 136, and 137, and a Detailed Fish and Wildlife Conservation and Recreation Plan for Weiss Dam and Reservoir Project (FPC 2146) Coosa River, Alabama prepared for the Alabama Power Company by the Fish and Wildlife Service. (Rotenone Sample)

* The E value of a species or group is the percentage of weight of the entire population composed of that species or group.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

ELECTROFISHING SURVEY, 1962

(One Hour Duration)

TABLE NO. A-11

	Oostanaula R. Above Rome	Coosa R. Below Rome	Coosa R. Below State Line
Flathead Catfish Over 12"			1
Flathead Catfish Under 12"	1		
Spotted Bass Over 9"	2	2	3
Largemouth Bass Over 10"	3	3	4
Largemouth Bass Under 10"	3	1	3
Bluegill Over 5"	4	2	2
Bluegill Under 5"	2		
Black Crappie Under 8"		1	
Yellowbelly Sunfish Under 5"		2	
Green Sunfish Under 5"			2
Redhorse	2	4	
Buffalo	1	3	3
Carp	5	13	13
Black Bullhead	2		1
Shad		4	15
Golden Shiner	—	1	—
	25	36	47

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

RESULTS OF CORE SAMPLING OF BOTTOM SEDIMENTS

TABLE NO. A-12

Mileage	Location of Core	Depth of Red Silt Layer (inches)
ETOWAH RIVER		
E-44.5	Right Side*	7
E- 6.4	Left Side	3
E- 0.1	Left Side	1/4
COOSA RIVER		
278.5	Left Side	1/4
278.5	Right Side	3/8
275.4	Left Side	3/8
268.5	Left Side	7-1/2
265.3	Right Side	9
247.9	Center	10-1/2
246.9	Center	4
245.9	Center	3

* Facing Downstream

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

BARIUM IN MINERAL WASTES AND IN RIVER BOTTOM SEDIMENTS

TABLE NO. A-13

Core Sample Location	Mileage	Barium, mg/g (dry weight)
New Riverside Sludge Pond		10.8
New Riverside Outfall Ditch into Etowah River		3.6
Etowah River	E-44.5	7.0
Etowah River	E- 6.4	2.6
Coosa River	275.4	1.7
Coosa River	268.5	2.1
Coosa River	265.3	1.6
Coosa River	247.9	4.7
Coosa River	245.9	2.2
Oostanaula River		0.0
Pumpkinvine Creek		0.0

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

RIVER DISCHARGE RECORDS

TABLE NO. A 14

SAMPLE STATION	RIVER MILE	U.S.G.S. IDENTIFICATION NO.	U.S.G.S. IDENTIFICATION LOCATION	DISCHARGE (cfs) AUGUST 1962 DATA INSTANTANEOUS RATE DURING SPECIAL SURVEY MAX.	INSTANTANEOUS RATE DURING SPECIAL SURVEY MIN.	MEAN DAILY DISCHARGE MAX.	MEAN DAILY DISCHARGE MIN.	MEAN DAILY DISCHARGE AVG.	LONG TERM AVERAGE YEARS	LONG TERM AVERAGE DISCHARGE
	ETOWAH RIVER									
E-9	E-78.0	2-3920	At Canton, Georgia	-	-	710	426	535	34	1,163
E-8	E-47.3	2-3940	At Allatoona Dam	7,250	280	2,610	264	1,476	23	1,677
E-7	E-44.5	-	-	7,280	140	-	-	-	-	-
E-6	E-39.0	-	-	6,600	274	-	-	-	-	-
E-3	E-21.4	-	-	5,300	500	2,820	562	1,741	-	-
E-2	E- 6.4	2-3960	At Rome, Georgia	4,940	616	2,860	640	1,808	39	2,803
	ETOWAH TRIBUTARIES									
PU-1	EPU-40.2-1.0		(Pumpkinvine Creek)	178	32	-	-	-	-	-
PE-1	EPE-37.0-1.0		(Pettit Creek)	12.0	5.5	-	-	-	-	-
EU-1	EEU-29.9-0.5		(Euharlee Creek)	-	-	-	-	-	-	-
SI-1	ESI- 0.4-2.2		(Silver Creek)	51.0	32.0	-	-	-	-	-
	OOSTANAULA RIVER AND TRIBUTARIES									
-	-	2-3870	Conasauga River at Tilton, Georgia	-	-	493	104	192	24	1,148
-	-	2-3835	Coosawattee River at Pine Chapel, Georgia	-	-	1,210	339	557	23	1,396
-	-	2-3875	Oostanaula River at Resaca, Georgia	-	-	1,480	505	789	69	2,745
O-1	O-1.3	2-3885	Oostanaula River near Rome, Georgia	1,190	239	1,520	660	910	22	3,411
	COOSA RIVER									
C-2	C-275.4		Mayo's Dam	4,820	1,160	-	-	-	-	-
-	-	2-3975	Cedar Creek at Cedartown, Georgia	-	-	80	47	61	19	150
	CHATTOOGA RIVER									
CH-6	CH-37.8	2-3980	At Summerville, Georgia	-	-	126	30	94	24	337
CH-1	CH-12.4	2-3983	Gaylesville, Alabama	-	-	219	150	174	3	-

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TABLE NO. A-15

SUSPENDED SEDIMENT LOAD

Etowah River: From Cartersville to Rome, Georgia
Plus Oostanaula and Coosa Rivers at Rome, Georgia

DAY	DATE	DISCHARGE (cfs)			TOTAL SUSPENDED SOLIDS						FIXED SUSPENDED SOLIDS						PERCENT FIXED %	TURBIDITY (Units)		
					CONCENTRATION (mg/l)			MASS (Tons/Day)			CONCENTRATION (mg/l)			MASS (Tons/Day)				CONCENTRATION		
		Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.		Avg.	Max.	Min.
		STATION E-8			Below Allatoona Dam - Above All Mineral Wash Water Discharges													RM E-47.3		
TUES.	8-21-62	1,730	7,100	290	12.5	15	10	58	70	47	7.5	10	5	35	47	23	60	8.3	10	5
WED.	8-22-62	1,660	7,850	290	11.7	15	10	52	67	45	5	10	0	22	45	0	42	13.3	15	10
THURS.	8-23-62	1,650	7,380	290	13.3	15	10	59	67	44	8.3	10	5	37	44	22	63	10.7	12	8
NO. OF SAMPLES					8						8							9		
3-DAY AVG.		1680			12.5			56			6.9			31			55	10.8		
		STATION E-7			Below New Riverside Ochre Co. - Above Thompson Weinman Co.													RM E-44.5		
TUES.	8-21-62	2,169	7,108	290	41	630	5	413	10,886	4	30	540	0	324	9,330	0	78	46	620	8
WED.	8-22-62	2,098	7,800	290	48	675	5	432	8,122	4	37	620	0	368	8,035	0	85	46	625	9
THURS.	8-23-62	2,108	7,880	140	67	900	10	806	14,447	9	49	805	0	655	12,678	0	81	38	455	10
NO. OF SAMPLES					120						120							60		
3-DAY AVG.		2123			52			550			39			449			81	43		
		STATION E-6			Below All Mineral Wash Water Discharges - Also Below Cartersville & Pumpkin Vine Creek													RM E-39.0		
TUES.	8-21-62	2,190	6,460	310	51	390	10	520	6,371	5	36	255	0	390	4,165	0	74	46	457	10
WED.	8-22-62	2,654	6,610	310	64	750	10	572	11,563	8	46	620	0	429	9,559	0	75	64	450	10
THURS.	8-23-62	2,335	6,400	274	69	470	15	548	7,233	15	52	420	10	458	6,464	10	84	70	465	13
NO. OF SAMPLES					123						123							59		
3-DAY AVG.		2393			61			549			45			426			78	60		
		STATION E-3			20 Miles Below Cartersville Area													RM E-21.4		
TUES.	8-21-62	1,900	5,080	500	47	260	10	387	2,597	15	34	225	5	307	2,247	7	79	50	190	10
WED.	8-22-62	2,030	5,320	680	57	150	15	448	1,600	30	43	120	6	340	1,279	12	76	39	155	8
THURS.	8-23-62	2,010	5,240	650	69	175	20	522	1,881	35	55	145	15	418	1,558	26	80	59	175	16
NO. OF SAMPLES					38						38							17		
3-DAY AVG.		1980			58			452			44			355			78	49		
		STATION E-2			35 Miles Below Cartersville Area - 6 Miles Above Confluence With Etowah River in Rome, Ga.													RM E-6.4		
TUES.	8-21-62	2,100	4,640	683	41	110	20	251	576	56	28	95	10	186	448	28	74	31	44	9
WED.	8-22-62	2,180	4,740	857	41	70	20	288	757	56	30	60	10	215	567	38	75	35	49	21
THURS.	8-23-62	2,240	4,940	748	59	110	25	401	1,370	52	44	90	15	308	1,121	31	77	52	100	26
FRI.	8-24-62	2,120	4,840	711	52	120	25	376	1,487	67	38	100	15	289	1,239	45	77	44	95	28
NO. OF SAMPLES					55						55							24		
4-DAY AVG.		2160			48			329			35			250			76	40		
		STATION O-1			1.3 Miles Above Confluence With Etowah River In Rome, Ga.													RM O-1.3		
TUES.	8-21-62	793	953	304	58	65	50	109	152	36	45	50	40	83	114	29	76	53	57	47
WED.	8-22-62	812	988	239	48	55	40	98	127	46	33	40	25	69	89	29	70	50	57	42
THURS.	8-23-62	1,000	1,859	335	52	60	40	131	190	56	37	40	30	92	127	42	70	52	57	42
FRI.	8-24-62	864	1,060	384	62	65	60	162	171	153	48	50	45	123	128	118	76	66	80	57
NO. OF SAMPLES					11						11							12		
4-DAY AVG.		867			55			125			41			92			73	55		
		STATION C-2			7 Miles Below Confluence With Etowah River In Rome, Ga.													RM C-278.45		
TUES.	8-21-62	3,165	4,460	2,110	46	70	35	383	602	211	33	55	15	278	450	90	73	43	71	27
WED.	8-22-62	3,054	4,660	1,160	43	55	20	342	663	63	32	44	10	254	540	31	74	48	71	38
THURS.	8-23-62	3,355	4,820	1,960	52	130	35	413	688	243	38	110	15	292	582	121	71	49	89	37
FRI.	8-24-62	3,098	4,560	2,180	39	55	25	322	546	150	27	45	15	230	412	90	71	48	73	31
NO. OF SAMPLES					52						52							25		
4-DAY AVG.		3168			45			365			33			264			72	47		

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TABLE NO. A-16

APPROXIMATE SUSPENDED SEDIMENT LOAD

Coosa River: - Below Rome, Georgia To State Line

DAY	DATE	TURBIDITY UNITS			TOTAL SUSPENDED SOLIDS						FIXED SUSPENDED SOLIDS					
					CONCENTRATION (mg/1)			MASS (Tons/Day)			CONCENTRATION (mg/1)			MASS (Tons/Day)		
		Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.
		STATION C-3			1.1 Miles Above Rome Kraft - 13.8 Miles Below Confluence With Etowah River									RM	C-268.5	
THURS.	8-23-62	44	47	38	36	45	25	308	385	214	24	30	15	205	257	128
FRI.	8-24-62	42	46	38	37	40	35	316	342	299	22	25	20	188	214	171
SAT.	8-25-62	41	48	30	33	35	25	282	299	214	22	25	15	188	214	128
SUN.	8-26-62	37	48	33	32	35	25	274	299	214	22	25	20	188	214	171
NO. OF SAMPLES		22			21						21					
4-DAY AVG.		41			34			292			22			192		
		STATION C-4			8.1 Miles Below Rome Kraft									RM	C-265.3	
THURS.	8-23-62	49	62	42	39	45	30	334	385	257	25	30	20	214	257	171
FRI.	8-24-62	45	48	40	46	70	35	393	599	299	28	40	20	239	342	171
SAT.	8-25-62	42	48	37	40	45	35	342	385	299	27	30	25	231	257	214
SUN.	8-26-62	42	48	38	42	50	35	359	428	299	28	30	25	239	257	214
NO. OF SAMPLES		21			22						22					
4-DAY AVG.		44			42			357			27			231		
		STATION C-6			3.1 Miles Above State Line - 10.4 Miles Below Rome Kraft									RM	C-256.0	
FRI.	8-24-62	38	44	34	38	60	30	325	513	257	26	35	20	222	299	171
SAT.	8-25-62	39	59	32	36	45	30	309	385	257	27	35	20	231	299	171
SUN.	8-26-62	36	47	24	35	40	30	299	342	257	24	30	20	205	257	171
MON.	8-27-62	35	45	28	32	45	20	274	385	171	20	25	10	171	214	86
TUES.	8-28-62	32	41	25	36	45	25	308	385	214	17	25	10	145	214	86
NO. OF SAMPLES		39			39						39					
5-DAY AVG.		36			35			303			23			195		
		STATION C-7			0.15 Miles Below State Line									RM	C-252.8	
FRI.	8-24-62	37	48	33	34	40	30	291	342	257	21	30	15	180	257	128
SAT.	8-25-62	37	52	28	34	45	30	291	385	257	23	30	20	197	257	171
SUN.	8-26-62	33	41	26	27	35	20	231	299	171	17	20	15	145	171	128
MON.	8-27-62	30	41	24	24	50	15	205	428	128	12	20	5	103	171	43
TUES.	8-28-62	29	35	26	31	35	20	265	299	171	15	20	10	128	171	86
NO. OF SAMPLES		39			39						39					
5-DAY AVG.		33			30			257			18			151		
		STATION BC-1			Big Cedar Creek Outlet - 2.9 Miles Above State Line									RM	CBC-255.8-0.3	
FRI.	8-24-62	37	40	34	34	40	25	5	6	4	19	25	10	3	4	1
SAT.	8-25-62	40	46	32	39	55	30	5	8	4	26	35	20	4	5	3
SUN.	8-26-62	39	47	30	32	55	25	4	8	3	18	35	15	2	5	2
MON.	8-27-62	35	42	28	30	45	15	4	6	2	19	30	5	3	4	1
TUES.	8-28-62	33	37	27	38	40	35	5	5	4	19	20	15	2	3	2
NO. OF SAMPLES		38			36						35					
5-DAY AVG.		37			35			5			20			3		

NOTE: COOSA RIVER - There are no discharge records available for these stations. Therefore, the 4-day average discharge of 3,168 cfs at RM 274.5 (Station C-2) is used to compute approximate Mass in Tons/Day.

BIG CEDAR RIVER - The Cedar River discharges at Cedartown, Ga. are used to compute approximate Mass in Tons/Day, i.e. Q for 8-24 to 28-62 = 53,51,51,50 and 48 cfs.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TABLE NO. A

TURBIDITY

Oostanaula R. vs. Etowah R. at Rome, Georgia

DAY	DATE	OOSTANAULA R.			ETOWAH R.		
		Mean Daily Discharge	TURBIDITY		Mean Daily Discharge	TURBIDITY	
			Concentration	Mass Equivalent		Concentration	Mass Equivalent
		(cfs)	(Units)	(Tons/Day)	(cfs)	(Units)	(Tons/Day)
T	8/8/61	1,560	32	137	2,800	260	1,965
W	9	1,540	37	154	2,800	300	2,268
T	10	1,600	37	160	2,890	360	2,722
F	11	1,460	28	110	2,800	280	2,117
S	12	1,420	23	88	2,600	220	1,544
Sunday	13	1,180	25	80	717	190	368
M	14	1,100	25	74	797	72	155
T	15	1,130	26	79	2,260	66	403
W	16	1,140	27	83	2,260	62	378
T	17	1,120	25	76	2,280	60	369
F	18	1,080	18	52	2,230	50	301
S	19	1,090	22	65	2,160	53	309
Sunday	20	930	19	48	665	48	86
M	21	910	21	52	728	16	31
T	22	1,010	20	54	1,840	22	109
W	23	1,030	22	61	1,950	60	316
T	24	1,040	22	62	2,020	125	686
F	25	1,080	18	52	1,940	190	995
S	26	1,100	21	62	1,860	160	803
Sunday	27	1,100	22	65	735	58	115
M	28	1,130	23	70	690	45	83
T	29	1,170	22	69	1,460	50	197
W	30	1,060	25	72	1,470	140	556
T	31	1,010	25	68	1,440	140	544
F	9/1/61	1,130	22	67	1,510	90	367
S	2	1,430	29	112	1,500	145	587
Sunday	3	1,590	55	236	700	80	151
M	4	1,230	75	249	607	60	98
T	5	1,100	55	163	648	58	101
W	6	1,080	29	85	1,310	120	424
T	7	1,110	36	108	1,390	132	495
F	8	1,120	32	97	1,330	130	467
S	9	1,070	32	92	1,330	90	323
Sunday	10	1,000	26	70	631	60	102
M	11	930	37	93	676	90	164
T	12	933	23	58	1,980	260	1,390
W	13	930	21	53	1,980	280	1,497
T	14	922	21	52	1,990	160	1,719
F	15	916	22	54	2,000	140	756
S	16	969	22	58	1,960	90	476
Sunday	17	910	22	54	612	58	96
M	18	890	23	55	663	95	170
T	19	922	27	67	2,180	140	824
W	20	885	26	62	2,240	160	888

Turbidity Data From Rome, Georgia, City Water Department.

Discharge Data From U.S.G.S.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

MEAN DISCHARGE - By Months

Oostanaula River at Rome, Georgia

TABLE NO. A 18

Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Max.	Min.	Mean	
															cfs	% of Avg.
1960 - 1961	1,592	1,182	2,262	2,482	10,050	9,064	5,098	2,220	4,542	2,649	1,223	993	32,300	790	3,568	104.6
1959 - 1960	1,364	3,035	3,732	4,483	6,767	8,121	4,322	2,017	1,148	881	1,332	1,122	18,400	495	3,183	93.3
1958 - 1959	983	914	1,147	3,444	4,226	4,111	6,148	2,519	3,036	1,508	897	957	14,600	629	2,474	72.5
1957 - 1958	2,338	7,483	5,951	4,063	5,496	5,446	5,506	6,237	1,445	2,954	1,461	1,201	20,500	791	4,123	120.8
1956 - 1957	712	737	2,713	3,527	12,660	5,085	7,964	2,245	2,352	1,372	721	1,961	32,300	442	3,432	100.6
1955 - 1956	834	1,395	1,319	1,156	11,430	6,636	8,509	3,450	1,350	1,400	904	820	20,000	530	3,225	94.5
1954 - 1955	531	637	2,090	3,025	3,049	5,103	6,653	3,512	1,593	1,521	983	579	22,700	408	2,819	82.6
1953 - 1954	638	687	2,706	11,940	2,994	6,244	5,210	2,901	2,007	1,013	1,039	530	28,800	428	3,172	93.0
1952 - 1953	702	1,016	2,479	7,512	9,542	5,736	2,797	5,405	1,283	1,898	789	935	18,400	520	3,310	97.0
1951 - 1952	858	3,036	9,916	7,233	5,272	11,510	3,832	2,233	2,041	935	1,318	1,110	23,100	650	4,119	120.7
1961 Calendar Yr.	819	984	12,610*	2,482	10,050	9,064	5,098	2,220	4,542	2,649	1,223	993	-	-	4,364	128.0
22 Years of Record =													47,000	408	3,411	

10 Year Average Discharge During December = 3,432 cfs.

*Average Discharge During December 1961 = 367% of 10 Year Average.

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

SEDIMENTATION - ETOWAH RIVER

TABLE NO. A-19

Below Allatoona Dam to Kingston, Georgia
(Data furnished by the Mobile District of the Corps of Engineers)

Location	Date	Computed time	Gage height	Mean daily Q cfs	Instant Q cfs	Temperature	Integrated samples suspended sed. P.P.M.
Allatoona Dam	8/9/61	11:40	7.05	2470	8200	73°	9.3
Highway #41	do	-	-	-	-		-
Highway #61	do	16:45	12.79	2640	6970	Estimated	374.3
Kingston, Ga.	do	22:00	9.17	2740	6860		53.3
Allatoona Dam	8/13/61	9:00	1.26	272	272		1.0
Highway #41	do	-	-	-	-		-
Highway #61	do	12:00	4.63	384	430		11.7
Kingston, Ga.	do	16:30	3.62	606	640		5.3
Allatoona Dam	9/14/61	12:00	5.99	1600	6930	63°	1.3
Highway #61	do	15:45	11.17	1760	5270		459.6
Kingston, Ga.	do	19:30	7.85	1980	4940		240.3
Allatoona Dam	9/17/61	8:30	1.18	248	248	Estimated	3.3
Highway #41	do	-	-	-	-		11.3
Highway #61	do	15:15	4.40	361	325		3.3
Kingston, Ga.	9/18/61	8:30	3.36	544	519		9.7
Highway #61	10/25/61	13:00	6.14	700	1370		294.7
Allatoona Dam	10/26/61	12:15	3.07	545	3590	55°	9.3
Highway #41	do	-	-	-	-	Estimated	605.0
Kingston, Ga.	do	20:00	4.52	783	1220		34.0

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

SEDIMENTATION - ETOWAH RIVER

TABLE NO. A-19

Below Allatoona Dam to Kingston, Georgia
(Data furnished by the Mobile District of the Corps of Engineers)
(continued)

Location	Date	Computed time	Gage height	Mean daily: Q cfs	Instant Q cfs	Temperature	Integrated samples suspended sed. P.P.M.
Allatoona Dam	10/29/61	9:00	1.21	256	256		4.3
Highway #41	do	-	-	-	-		3.7
Highway #61	do	10:00	4.41	334	329		18.3
Kingston, Ga.	do	17:15	3.28	495	487		3.3
Allatoona Dam	12/7/61	12:00	7.01	2820	8150	52°	46.2
Highway #41	do	-	-	-	-	52°	47.2
Highway #61	do	13:00	13.09	2980	6200	54°	130.4
Kingston, Ga.	do	18:15	8.68	3210	6120	51°	298.4
Highway #41	12/11/61	-	-	-	-	54°	47.2
Highway #61	do	9:30	5.76	4140	1120	53°	92.2
Allatoona Dam	1/9/62	10:00	7.36	8560	8570	50°	19.8
Highway #41	do	-	-	-	-	Estimated	
Highway #61	do	12:00	14.65	9030	9020		113.8
Kingston, Ga.	do	17:30	10.78	9140	9350		77.8
Allatoona Dam	2/15/62	10:45	6.93	4000	8060	48°	6.2
Highway #41	do	-	-	-	-	48°	21.1
Highway #61	do	13:00	13.67	4220	7940	49°	62.1
Kingston, Ga.	do	17:00	9.25	4390	6980	50°	244.8
Allatoona Dam	2/17/62	18:00	1.24	241	241	48°	8.9
Highway #41	2/18/62	-	-	-	-	48°	7.5
Highway #61	do	9:00	4.76	529	495	50°	27.7
Kingston, Ga.	do	11:20	4.10	892	910	52°	10.8

TABLE NO. A-19

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

SEDIMENTATION - ETOWAH RIVER

Below Allatoona Dam to Kingston, Georgia
(Data furnished by the Mobile District of the Corps of Engineers)
(continued)

Location	Date	Computed time	Gage height	Mean daily: Q cfs	Instant Q cfs	Temperature	Integrated samples suspended sed. P.P.M.
Allatoona Dam	3/23/62	11:00	5.67	4470	6540	51°	11.6
Highway #41	do	-	-	-	-	49°	24.1
Highway #61	do	13:00	12.65	4780	6820	54°	76.0
Kingston, Ga.	do	19:45	9.42	5240	7230	53°	92.8
Allatoona Dam	3/24/62	8:00	1.25	248	248	51°	12.7
Highway #41	3/25/62	-	-	-	-	49°	15.4
Highway #61	do	9:15	4.88	613	560	52°	113.1
Kingston, Ga.	do	16:15	4.35	1070	515	56°	31.3
Allatoona Dam	5/3/62	13:30	7.03	4940	8180	58°	16.8
Highway #41	do	-	-	-	-	61°	7.8
Highway #61	do	16:00	14.15	5090	8460	58°	51.9
Kingston, Ga.	do	19:00	10.17	4650	8370	60°	143.9
Allatoona Dam	5/5/62	9:30	1.27	280	272	58°	5.9
Highway #41	do	-	-	-	-	58°	7.6
Kingston, Ga.	do	18:00	4.09	2510	904	60°	10.0
Highway #61	5/6/62	8:00	4.84	665	538	58°	30.7
Allatoona Dam	7/12/62	12:00	5.92	1900	6840	66°	12.0
Highway #41	do	-	-	-	-	67°	139.1
Highway #61	do	17:15	11.27	2100	5370	74°	69.4
Kingston, Ga.	do	18:15	7.84	-	4930	74°	131.3
Allatoona Dam	7/13/62	18:00	1.25	264	248	66°	7.8
Highway #41	7/14/62	-	-	-	-	67°	11.1
Highway #61	7/15/62	9:45	4.81	440	521	72°	20.6

Location By River Mile & Survey Station No.

Allatoona Dam = RM E-47.0 = Near Sta. E-8
Highway No. 41 = RM E-[illegible]5.1 = 0.4 Miles Above Sta. E-7
Highway No. 61 = RM E-38.2 = 0.8 Miles Below Sta.
Kingston, Ga. = RM E-21.4 = Sta. E-3

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TABLE NO. A-20

DISCHARGE

SUMMARY 1960-1961 WATER YEAR

Oostanaula River at Rome, Georgia

MONTH		MEAN			
		cfs	% of Annual Average	MAX. cfs	MIN. cfs
October	1960	1,592	45	4,230	870
November		1,182	33	2,340	830
December		2,262	63	6,800	1,120
January	1961	2,482	70	5,000	1,490
February		10,051	282	32,300	1,480
March		9,064	254	28,600	2,950
April		5,098	143	13,000	2,540
May		2,220	62	3,500	1,750
June		4,542	127	14,500	1,380
July		2,649	74	4,930	1,380
August		1,223	34	1,660	910
September		993	28	1,590	790
Annual Mean		3,568	-	-	-
Max.		-	282	32,300	-
Min.		-	28	-	790

Max. Discharge in February
Min. Discharge in September

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TABLE NO. A-21

TURBIDITY - CONCENTRATION

SUMMARY 1960-1961 WATER YEAR

Oostanaula River at Rome, Georgia

MONTH		MEAN Arithmetic Avg. Units	MEAN Arithmetic Avg. % of Annual Average	MEAN Weighted Average Units	MAX. Units	MIN. Units
October	1960	47	77	63	160	17
November		17	28	19	50	10
December		46	75	84	280	10
January	1961	30	49	40	140	10
February		97	159	181	370	10
March		74	121	116	290	13
April		58	95	88	190	15
May		31	51	32	130	15
June		156	256	189	430	17
July		119	195	135	490	28
August		30	49	31	62	18
September		28	46	30	75	18
Annual Mean		61	-	116	-	-
Max.		-	256	-	490	-
Min.		-	46	-	-	10

Max. Concentration in June
Min. Concentration in September

COOSA RIVER SYSTEM - GEORGIA-ALABAMA

TURBIDITY - MASS

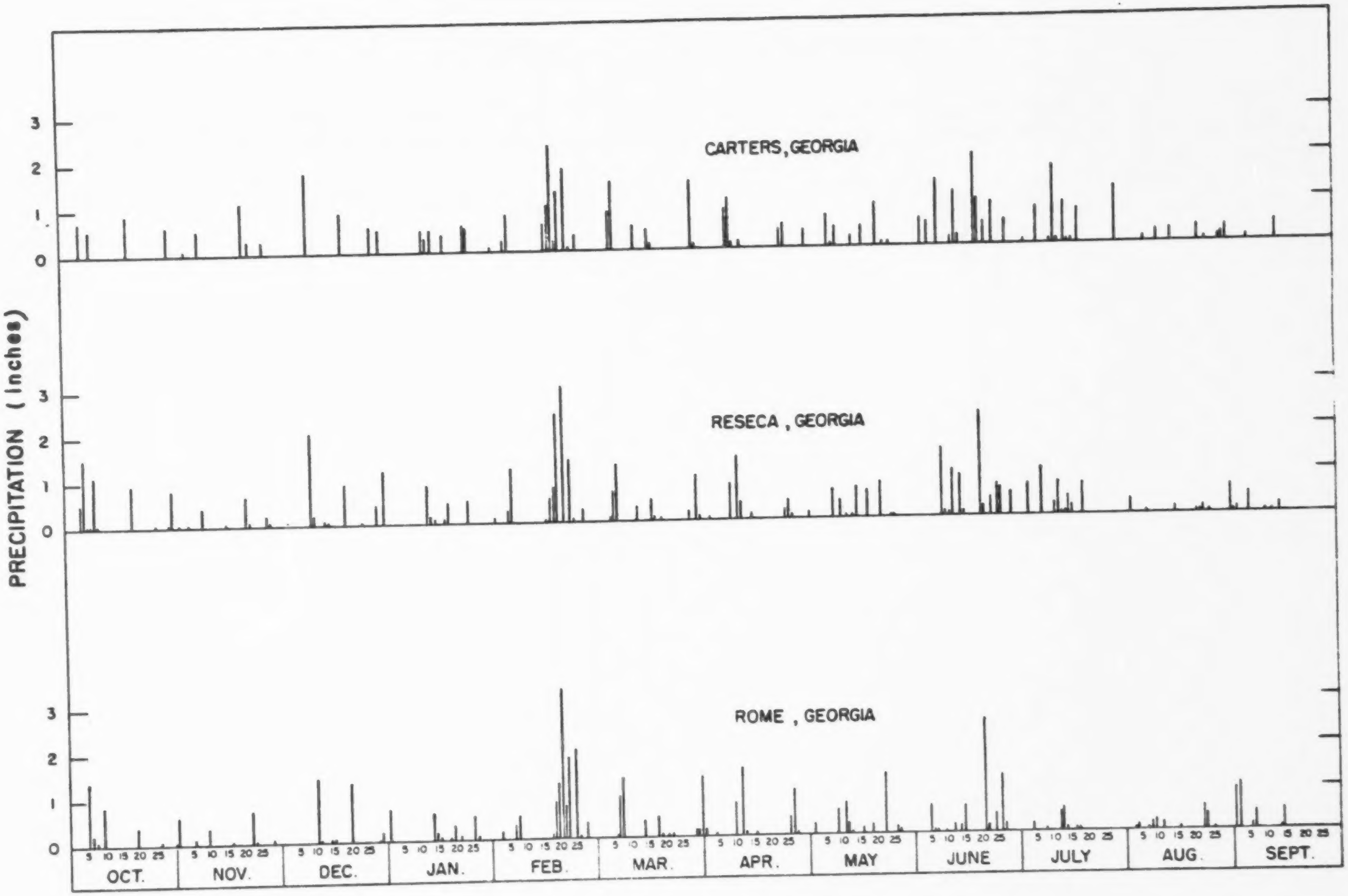
TABLE NO. A-22

SUMMARY 1960-1961 WATER YEAR

Oostanaula River at Rome, Georgia

MONTH		MEAN		MAX.	MIN.
		Tons Per Day	% of Annual Average	Tons Per Day	Tons Per Day
October	1960	272	24	1,827	42
November		62	5	312	22
December		511	46	4,642	30
January	1961	266	24	1,890	40
February		4,927	440	17,782	40
March		2,837	254	14,407	106
April		1,211	108	6,318	103
May		194	117	989	75
June		2,315	207	8,910	63
July		996	89	6,522	160
August		103	9	236	52
September		81	7	249	42
Annual Mean		1,119	-	-	-
Max.		-	440	17,782	-
Min.		-	7	-	22

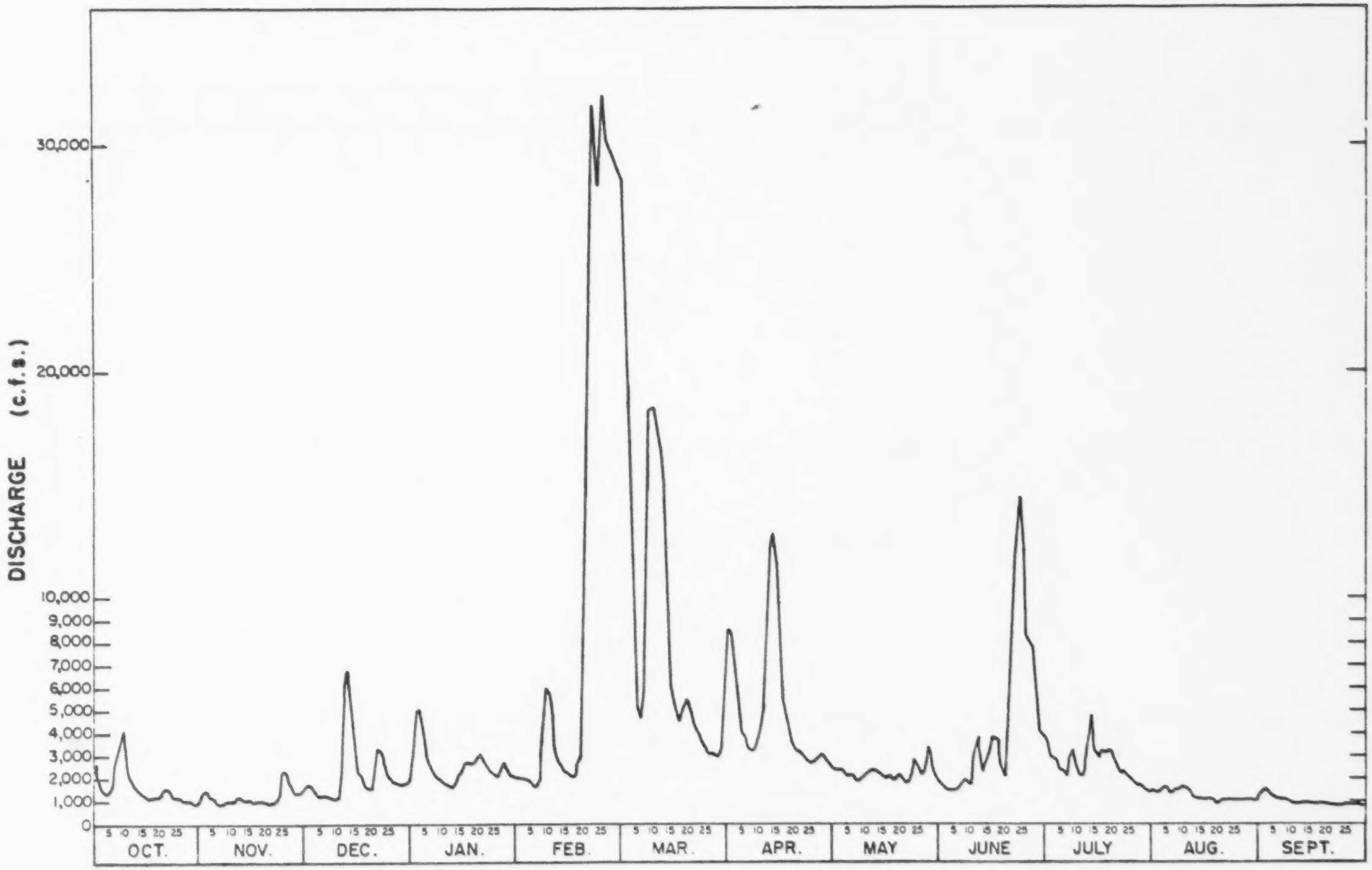
Max. Mass in February
Min. Mass in September



OOSTANAULA RIVER

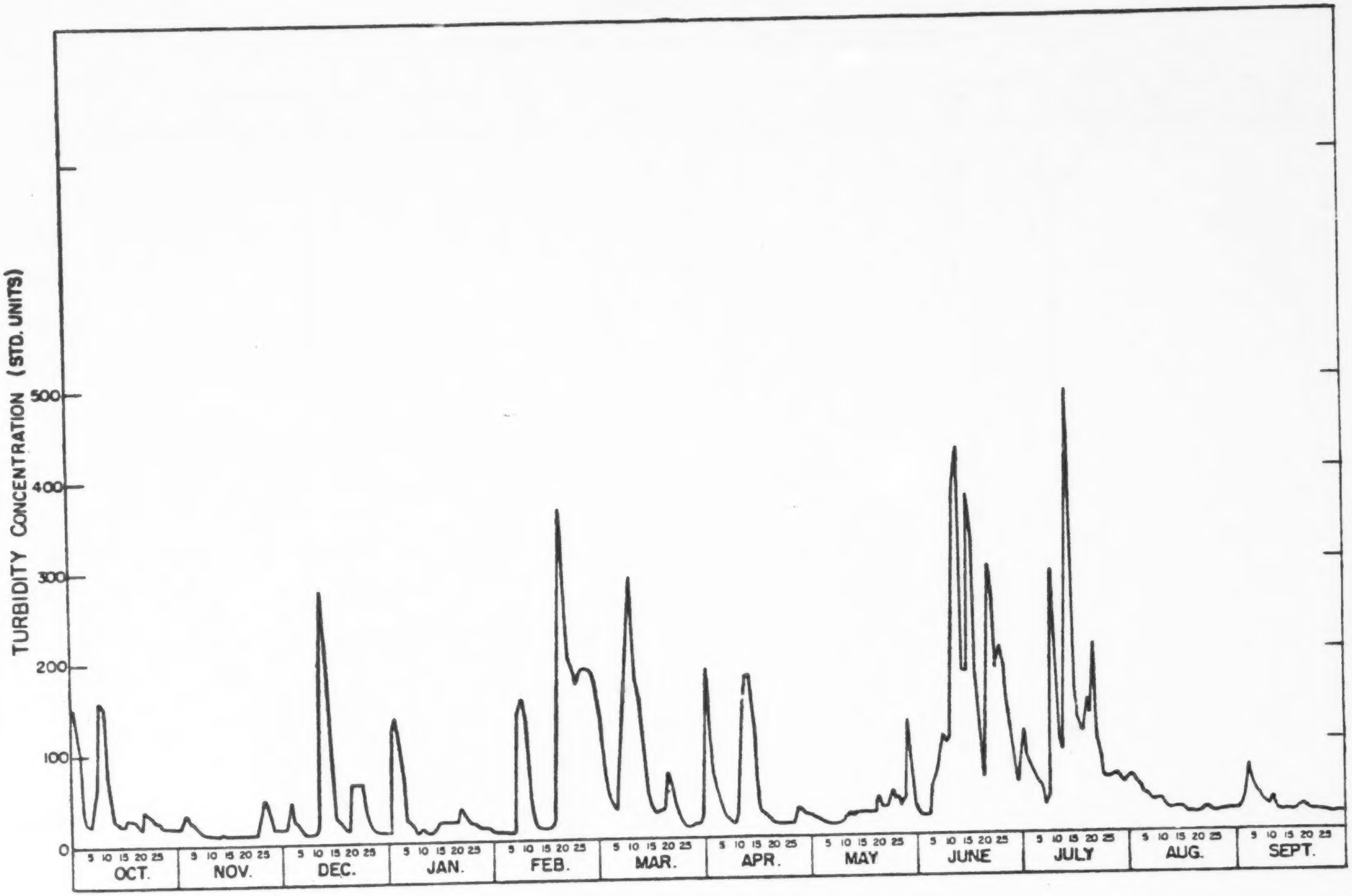
PRECIPITATION IN DRAINAGE BASIN
1960 – 1961 WATER YEAR

Figure A-1



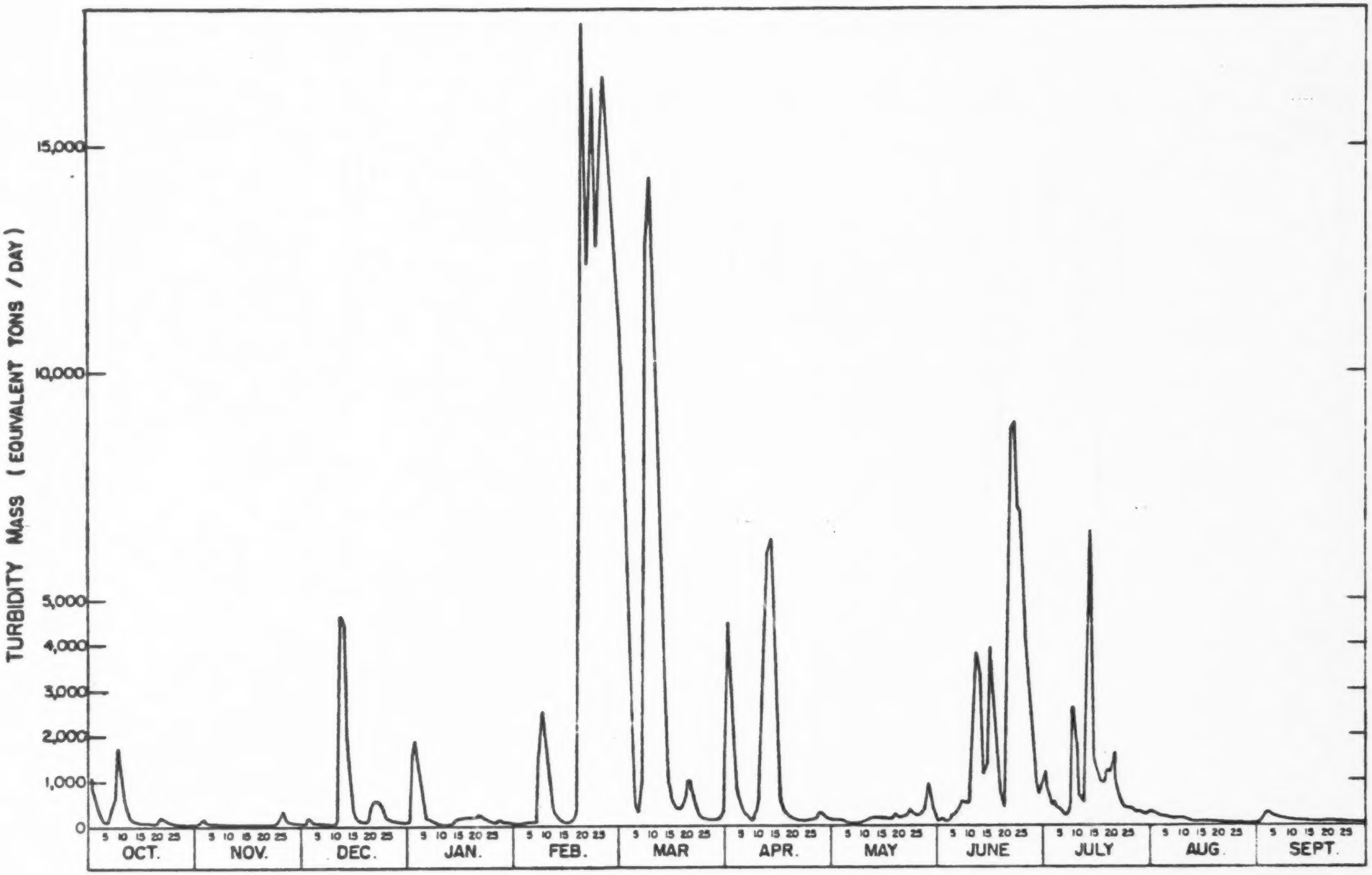
OOSTANAULA RIVER AT ROME, GEORGIA
DISCHARGE
1960 — 1961 WATER YEAR

Figure A-7



OOSTANAULA RIVER AT ROME, GEORGIA
TURBIDITY - CONCENTRATION
1960 – 1961 WATER YEAR

Figure A-3



OOSTANAULA RIVER AT ROME, GEORGIA
TURBIDITY — MASS
1960 — 1961 WATER YEAR

Figure A-4

The next order of procedure is for the conferees to make comments on Mr. West's statement and ask questions; but, before we do that, we would like to take a fifteen-minute recess. We stand recessed for fifteen minutes.

(A fifteen-minute recess was taken.)

CHAIRMAN STEIN: We will reconvene, please.

I have been urged to make a suggestion to invite you to take your jackets off.

I would like to call on Alabama. Do you have any comments or questions on Mr. West's remarks?

DR. MYERS: Mr. Chairman and Brother Conferees: I want to commend this last presentation on its completeness, and in view of the volume of material which has been covered, I think he did a remarkable job in summarizing it in this short period of time.

We feel privileged in Alabama to have had the opportunity of cooperating with the group making this study and we found them most cooperative in every respect.

I think it is most beneficial that the entire facts be presented to the group, and we personally appreciate the clarity with which it has been presented.

CHAIRMAN STEIN: Thank you, Dr. Myers.

Do we have any comments or questions from Georgia?

DR. VENABLE: Mr. Chairman, I would like to ask Mr. West a few questions, if I might.

MR. WEST: I will try to answer them.

DR. VENABLE: Mr. West, I, too, appreciate the job you did on this report, but there are a few questions about it that I think ought to be brought out.

As I understand it, you made this study in August 1962.

MR. WEST: That is correct.

DR. VENABLE: Only in August 1962?

MR. WEST: The actual survey was in August 1962. We did some preliminary work a few months earlier, but the field survey was in August 1962 and that's the bulk, almost all of the report, all the data in the different reports.

DR. VENABLE: Are the data in this report entirely those that you picked up in your one-month study?

MR. WEST: Sir?

DR. VENABLE: Did you use any data except those you yourself gathered?

MR. WEST: Yes. We have data that was provided to us by other agencies, by the Corps of Engineers, by the Soil Conservation Commission, the City of Rome, Rome Kraft paper mill, and many other sources that I enumerated in the report,and they are so listed.

DR. VENABLE: Do you include data in this report that you obtained from the Georgia Department of Public Health?

MR. WEST: No, we did not include the data from the Georgia Department of Public Health. We used that as background information to set up our stream stations and to get an idea of the values that we might find during this intensive survey in August.

DR. VENABLE: Did you find any data in conflict with those you obtained from the Georgia Department of Public Health?

MR. WEST: I don't recall distinct conflicts. I recall some differences because they were taken at different periods of the year.

DR. VENABLE: It is true, is it not, that a river may differ from one month to another month and throughout the various seasons of the year?

MR. WEST: Absolutely, sir.

DR. VENABLE: So that your data applied only to August 1962, and not necessarily even to August of 1961 or August 1963?

MR. WEST: That is correct. It would be the report of the August survey.

DR. VENABLE: And your generalization then that such conditions exist in the river is based not just on your own data, but on data you obtained from other sources?

MR. WEST: Yes, sir.

DR. VENABLE: Now will you tell me what you used as standards at the state line which, I believe, led you to conclude that the conditions of the two rivers at the state line were disadvantageous to the health and welfare of the people of Alabama?

MR. WEST: The two standards; dissolved oxygen and the coliform bacterial content, and, on the Coosa River, the biological findings.

DR. VENABLE: These various sets of data were not in agreement on all of the rivers? You have three sets of standards, I believe you said.

MR. WEST: Basically, three sets. We also discussed pH, of course; but the three significant ones are dissolved oxygen, coliform and biology.

DR. VENABLE: But these were not uniformly indicative of the same conditions?

MR. WEST: Well, the dissolved oxygen and the coliform pretty much told the same picture, except that coliform, as you so well know, is pretty much an indication of sewage pollution bacterial content, while the dissolved oxygen more nearly reflects the organic wastes coming down. But they had a good, parallel story all the way down the rivers. The biology studies were quite parallel on the Etowah and on the Coosa, but on the Chattooga River they revealed the intensity of this pollution in the interstate reaches. But here at the end of the reach the river had recovered, as indicated; that is, the bottom of the river had recovered, as indicated in the report and the presentation. But the adverse effects of pollution then are described by the unfavorable coliform and dissolved oxygen concentration.

DR. VENABLE: But in either case, in the case of either river, are all four standards adverse at the state line?

MR. WEST: All four? No, sir.

DR. VENABLE: So you used those that were adverse on which to base your conclusions, but ignored those which were not adverse?

MR. WEST: No, sir; we did not ignore them. They are brought out --

DR. VENABLE: You report that they are within limits of standards, however?

MR. WEST: That is correct.

DR. VENABLE: But you draw your conclusion that the river is adverse to the health and welfare of Alabama on the basis of less than all four standards?

MR. WEST: That is usually the case with any kind of a --I mean, we know that -- well, how can I illustrate this? We know the water --

DR. VENABLE: I wouldn't debate the point with you. This is perfectly true; but it is true in this case, isn't it?

MR. WEST: It is true, and it is true for many cases. You study a whole host of parameters. Now ph, for instance, on the Coosa River -- we studied this. There was no real adverse influence of pH, but we recorded the data. So it's there. So it was not of important significance or an important feature on the program to determine whether or not the river was polluted.

DR. VENABLE: Do I hear you saying that when it is not adverse, it is not an important feature?

MR. WEST: No.

DR. VENABLE: I thought I heard you say that, I would like for it to be perfectly clear.

MR. WEST: It was not an -- it did not show that the river was polluted by that parameter alone, but the other parameters did. So naturally --

DR. VENABLE: So you chose your conclusion on the basis of the parameters that did?

MR. WEST: That's right.

DR. VENABLE: What are your standards -- what standards did you use for B.O.D.?

MR. WEST: B.O.D.? We don't use a standard of B.O.D. in the river as a measurement of the river quality. It is just an indication of how much or how little of the organic material is going into the river. But the net results of this, the important thing is: What does the B.O.D. do to the river? And that is shown by the actual dissolved oxygen that is in the river as it is flowing down past the various stations.

DR. VENABLE: What dissolved oxygen standard did you use?

MR. WEST: We used the standard of 4 mg/l.

DR. VENABLE: What is the validity of that standard.

MR. WEST: We quoted the validity there because that is the minimum requirement by the Alabama Water Resources Commission and the commonly accepted low minimum by many states in the nation.

DR. VENABLE: This is the standard adopted by the State of Alabama for its own water?

MR. WEST: I assume it is. I think we can ask the State of Alabama about it.

DR. VENABLE: What authority does the State of Alabama have to adopt the standard of dissolved oxygen for water coming into it from another state at the state line?

MR. WEST: I don't know what authority they have.

DR. VENABLE: You used the phrasing in the report, I believe, Mr. West, as that required by the State of Alabama?

MR. WEST: Yes.

DR. VENABLE: The 4 mg dissolved oxygen content?

MR. WEST: That is correct.

DR. VENABLE: Now what is the authority for that?

MR. WEST: For waters entering the state, for waters in the State of Alabama.

DR. VENABLE: Alabama has the authority to adopt such a standard for waters coming out of another state?

MR. WEST: I think you are getting beyond my scope, as far as legal authority.

DR. VENABLE: Mr. West, I believe you used the phrase in there, "required by the State of Alabama Water Improvement Commission."

MR. WEST: Yes, I did.

DR. VENABLE: But you applied that to Georgia waters?

MR. WEST: I applied that to water crossing the state line; yes.

DR. VENABLE: Now you say that 4 ppm of dissolved oxygen is a generally accepted standard. What is the scientific basis for this.

MR. WEST: I think the scientific basis for that is more based on the effect it has on the fish and the fish habitat. I am sure the biologists are more qualified to discuss that in detail than I am. I am quoting the accepted standards within the profession. I haven't studied the effects.

DR. VENABLE: There is nothing official about these. This is the general scientific consensus, you say?

MR. WEST: It is.

DR. VENABLE: What is your standard on coliform bacteria?

MR. WEST: The standard on coliform bacteria is a minimum of about 5,000 MPN/100 ml for raw water which is to be used, which is to be treated, and 1,000 for water-contact sports. That again, is generally--

DR. VENABLE: Would you again refresh my memory on the measurement of coliform bacteria at the state line on both of these rivers?

MR. WEST: The exact numbers?

DR. VENABLE: In August 1962.

MR. WEST: In both cases they exceeded the 1,000, or the normally accepted requirement for water-contact sports. I can get the report and find the exact figures.

DR. VENABLE: What is the basis for the reduction to 20% from that necessary for treatable water, for water sports? Is this an arbitrary again, a generally accepted opinion, or is there scientific basis for it?

MR. WEST: I am not able to discuss the background of that. Mr. Kittrell of our section could discuss that for you in more detail, the background and why these standards were brought into play.

DR. VENABLE: But it is true that if the coliform count does not exceed 5,000, the water is generally approved for treatment for human consumption?

MR. WEST: Will you restate that, please?

DR. VENABLE: It is true that 5,000 is the cutoff point above which water will not be judged to be treatable for human consumption?

MR. WEST: I would say it is a guide and a goal, and I am sure there are waters above that that are being treated; but that is the level that we try to attain. It is the cutoff point that we consider; yes, sir.

DR. VENABLE: But is it not true that on both the Coosa and the Chattooga the count at the state line in August 1962 did not exceed 5,000?

MR. WEST: Yes, sir; that is correct.

DR. VENABLE: So that the water, as it enters Alabama from the State of Georgia, is generally judged to be treatable according to the coliform standards for human consumption.

MR. WEST: According to coliform standards, it would be.

MR. THOMAN: For the purposes of the record, the record states that the average is then decreased to 7,400 MPN/100 ml two miles above the state line and 6,000 three miles below the state line. These both are above the limits of 5,000 per 100 ml.

MR. WEST: May I add that correction?

DR. VENABLE: Yes.

MR. WEST: 6,000.

DR. VENABLE: This is not true on the Coosa?

MR. WEST: That is not true on the Chattooga.

DR. VENABLE: I thought this was the Chattooga you were referring to.

MR. WEST: The Chattooga. That is not true on the Coosa. Excuse me. It is true on one river system and not on the other.

DR. VENABLE: Can you explain to the group and to me, for that matter, the impact of the studies on pH? What effect on the health and welfare of the people of Alabama would abnormal acidity or alkalinity have?

MR. WEST: The ranges we are talking of there, the abnormal ranges would have an adverse effect on the fish and the aquatic habitat, but those ranges of pH, as reported in this document, would not have an adverse effect on people using the water itself. That was related to the fish habitat.

DR. VENABLE: One other question, if I may, Mr. West. I understood you, in summarizing and reading from the report or summary, to mention Celanese Corporation.

MR. WEST: Yes, sir.

DR. VENABLE: Which I do not recall having seen in the report.

MR. WEST: That is correct.

DR. VENABLE: I would move, Mr. Chairman, that that name be stricken from the record of this meeting. The name was not in the report which was introduced as part of the conference record, and it seems to me that we ought to have this conference on the basis of the report as it was issued.

CHAIRMAN STEIN: I will consider that in the discussion, but Alabama is a conferee and we would like to have Alabama's views on it,too. But that will be considered.

DR. VENABLE: Mr. West, as I understand it then, to sum up to be sure I understand the answer to my question; in the case of both the Coosa and the Chattooga there is significant pollution along the stream beds, which the federal people have helped us in Georgia to define an interstate pollutional matter?

MR. WEST: Yes, sir.

DR. VENABLE: But when it comes to the condition of these waters at the state line, in no case can all of the standards of pollution be applied to show adversely against this water, but only in each case can a certain set of less than the four standards be offered in evidence of pollution in interstate operation?

MR. WEST: That is correct.

DR. VENABLE: Thank you.

MR. WEST: But I wonder if the implication is correct there. I agree that all standards don't uniformly --

DR. VENABLE: Mr. West, I am not asking for implications. I asked the question and got the answer. Thank you, sir.

CHAIRMAN STEIN: I think in this conference that this is not a rigid cross-examination. You're not cutting anyone off.

DR. VENABLE: I simply indicated I was satisfied, Mr. Chairman. If Mr. West is not, he can talk another hour and a half.

MR. WEST: I don't feel like talking another hour and a half, Mr. Stein.

CHAIRMAN STEIN: Do you have any further questions from Alabama, in view of that question?

DR. MYERS: No questions.

CHAIRMAN STEIN: Mr. Thoman, do you have any?

MR. THOMAN: No, except to make this general statement, that pollution can be a series of parameters which fall below certain accepted or legal standards. The three or four that were investigated here and written up merely relate to the important ones in this particular case.

In other situations it could well be something, such as chlorides.

It could be cyanides; it could be any sort of other toxic material. Now just because the waters of the Chattooga and the Coosa at the state line in both cases did not meet all of these four criteria or, for a fact, they didn't meet maybe a thousand other criteria, or did meet a thousand other parameters; if there is no dissolved oxygen in the river, it is polluted regardless of what the pH is, the chlorides are, the cyanides are, the pesticides, or any other one thing that is in there.

MR. WEST: Thank you, Mr. Thoman. You expressed the thought I tried to get across.

DR. VENABLE: Is Mr. Thoman available to question, Mr. Chairman?

CHAIRMAN STEIN: Yes, he certainly is.

DR. VENABLE: Mr. Thoman, you mentioned legal standards. Would you give me some indication of what legal standards apply in a case of this character.

MR. THOMAN: There are no legal standards which apply in this particular case.

DR. VENABLE: But you referred to legal standards?

MR. THOMAN: Some states do have legal requirements for certain materials.

DR. VENABLE: But legal standards, as such, are not a factor in our discussion today?

MR. THOMAN: That is correct.

DR. VENABLE: May I ask one other question?

CHAIRMAN STEIN: Yes.

DR. VENABLE: You say that water with no dissolved oxygen is polluted, per se; is that your statement?

MR. THOMAN: I would think that would be a correct interpretation; yes.

DR. VENABLE: What about the Army Engineers, who release water from Allatoona Dam with absolutely no dissolved oxygen in it when it's released; is this polluted water?

MR. THOMAN: If the damages can be demonstrated; yes.

DR. VENABLE: Is it polluted? I agree with you, it can cause damage; but is it polluted?

MR. THOMAN: If damages occur.

DR. VENABLE: Thank you.

CHAIRMAN STEIN: Let's see if I understand this, Mr. West. This has been a very interesting colloquy. As I get the situation, you have examined past data and you have done an intensive survey during the month of August 1962 and arrived at certain conclusions. Do you believe on that basis that about the same situation obtains at the present time throughout the year, that these are indicative of the water quality situation on the river?

MR. WEST: That is a hard one to answer. If the stream flow did not change and during these equivalent summer months of the year, and if no special facilities or changes were made in waste discharges, the conditions would be similar to what we have.

CHAIRMAN STEIN: Well, you don't have any indication of any new facilities going in, do you?

MR. WEST: I have no indication now. I hope maybe we will hear of some new ones.

CHAIRMAN STEIN: But in other words, what I am saying, I am just trying to get an understanding; as I understand the purport of this report, or of any report of this nature, the purport is that what you are trying to do is to indicate a general water quality condition. You are not resting completely on the narrow issue that this was the condition just in August 1962, which suddenly stopped there or didn't start there, but this might be indicative of the condition which exists today?

MR. WEST: That is right. The general pattern should be similar, but it cannot be precise.

CHAIRMAN STEIN: We understand that.

Then, let me see if I can understand this other business. For example, you did not look at the content of these river systems for radiation, did you?

MR. WEST: No, I didn't.

CHAIRMAN STEIN: And as far as you can guess, why didn't you look for it? You didn't think you could find anything significant?

MR. WEST: I didn't think I would find any radiation, which also could be a pollutant.

CHAIRMAN STEIN: Now the fact that you didn't find radiation, or using that, did that mean that the river, because you didn't strike the box score on that, possibly it couldn't be polluted so that it would interfere with fish life.

MR. WEST: Sir?

CHAIRMAN STEIN: Supposing you had an oxygen depletion.

MR. WEST: Yes.

CHAIRMAN STEIN: Wouldn't that just indicate pollution to fish life?

MR. WEST: That would indicate that the river was polluted, right there.

CHAIRMAN STEIN: Again trying to understand this, you talked in terms of oxygen depletion crossing the state line.

MR. WEST: Yes, sir.

CHAIRMAN STEIN: Which interfered with fish and aquatic life, and consequently possibly recreational uses?

MR. WEST: That's correct.

CHAIRMAN STEIN: You talked in terms of coliform count going into Alabama. The coliform count is considerably above 1,000 from the records you used. Water, per se, of that range could be taken into a water intake by a municipality and treated satisfactorily, and put out as a potable, safe water. The point is, as I understand it, that you didn't talk about interference with municipal water supplies, but with water contact sports.

MR. WEST: That is correct.

CHAIRMAN STEIN: That is the kind of water you can take in a water intake and make into a safe, potable water, and it might be the kind of water you wouldn't want to have in a swimming pool for your children to swim in. I understand there is a difference.

MR. WEST: That is correct.

CHAIRMAN STEIN: One is 5,000 and the other may be, if you have one in this state, of 250.

MR. WEST: That is correct.

CHAIRMAN STEIN: Okay. Now the next point I would like to go into -- I don't know if we ought to do this. As far as I know, the requirement of 4 ppm of oxygen for propagation of fish life is based on the consensus of biologists throughout the country, and some of them ask for 5, for conditions which they have found over a vast amount of experimentation that fish will thrive and reproduce.

I think here we are dealing with a situation involving physical facts and physical measurements. The point is, we are dealing with a water interference, or an interference in the water use. I don't think the question of 4, 5, or any other number is the important thing.

If, in fact, pollution from one state endangers the fish population in another state, conceivably this may be an indication of endangering welfare of persons in another state. If 4 is considered the measure to show that it endangers fish life, this is the meaning of a standard such as 4, as I understand it. Is that correct?

MR. WEST: That is correct.

CHAIRMAN STEIN: I don't have any further comment or question.

DR. VENABLE: Fish will not live in water with dissolved oxygen below 4 ppm?

MR. WEST: No. I said fish will not live in zero dissolved oxygen. If the habitat --

DR. VENABLE: The Chairman was asking you about the 4 ppm and whether water of less than 4 ppm interfered with fish life, so I understood him. I had a little difficulty hearing him from behind, but I thought that was your question.

CHAIRMAN STEIN: As I understand it, let me repeat it now. As I understand this from the literature here, water having an oxygen content of less than 4 ppm would interfere with the propagation and optimum development of fish, as I understand it from the biologists. And if we need that further clarified, we may ask a biologist to do that. But this is my statement. Do you agree with that?

MR. WEST: That's right. We are just talking about normal conditions. This thing isn't quite that precise. I tried to the best of my ability to indicate what were the accepted standards and what they mean. Shall I just read this section again?

CHAIRMAN STEIN: No; I don't think that is necessary.

DR. VENABLE: Exactly the point I was trying to make, you just made. This is not precise, and I object to your positive, affirmative answer to the Chairman on the basis of 4 ppm. Do you mean to tell me that 3.9 ppm will make a difference in fish life?

MR. WEST: Any difference down the scale gives a greater adverse effect on the fish, but the figure of 3.9, or 4.0, or 4.1 --

DR. VENABLE: Is this a linear effect all the way down from 12 to zero?

MR. WEST: I don't know if it's linear.

DR. VENABLE: We are using these as conclusions, Mr. West. I don't object to your not knowing at all. Neither you, nor I, nor biologists; but we are talking about standards, and you have used standards with which to come to conclusions in this report and recommendation.

MR. WEST: Yes, sir.

DR. VENABLE: And now you tell me this is not precise.

MR. WEST: Doctor, we have a standard as a guide line, and --

MR. THOMAN: Doctor, I think I can use an analogy in the form of a question.

DR. VENABLE: Mr. Thoman, I know the answers to these. I've been to school, too, but quit trying to influence the audience with all this technical stuff.

MR. THOMAN: I don't believe we are, sir. I raise the question:

At what point of the red blood cells in a person's body is he anemic?

CHAIRMAN STEIN: Let's not go afield, please.

DR. VENABLE: I don't know.

CHAIRMAN STEIN: Let me try to understand this, Doctor. The situation as I understand it is we are not dealing on the 4 ppm with averages. We would like the average to be high. What they are doing with 4 ppm is dealing with a minimum, at least 4 ppm.

Now I think that we can all agree with you that if one or two samples got into the range of 3.9 and didn't meet this 4 ppm, possibly no great harm would be done. As I understand what the biologists have put into the report is that they took the minimum that the biologists believe is necessary for the propagation and sustaining of fish life, and half of the samples taken at the Alabama state line fell below these 4 parts. Now this does not make this a marginal situation.

Is that a correct statement of what you said?

MR. WEST: Yes, that is a correct statement.

CHAIRMAN STEIN: And I would thoroughly agree with you, Doctor, that when we get to a marginal thing in dealing with these recommendations, you are not dealing with a precise, rigid kind of operation. But when we have substantial deviations from it, I think the biologists generally say that there is a deleterious effect on fish life.

DR. VENABLE: May I ask Mr. West another question?

I understood you did not make any studies in relation to either of these rivers in regard to radiation.

MR. WEST: No.

DR. VENABLE: The reason you gave for not doing this was that you did not believe there was radiation there to be found?

MR. WEST: I wasn't aware of any radiation problem; that's right.

DR. VENABLE: So you studied only those things you had some reason to believe were present?

MR. WEST: That is correct. I didn't make a study for salt pollution, or any other types of pollution that might be found in other areas. This way a survey to evaluate whether or not there was pollution, but you can't go through the whole line of every possible type of chemicals or organic material that could pollute a stream.

DR. VENABLE: This is therefore an incomplete study?

MR. WEST: No, sir. This is a very comprehensive study, sir.

DR. VENABLE: For August 1962, but it did not consider other than four standards. You really don't know what the river is like, except in the four areas you studied.

MR. WEST: In the four standards that we studied.

DR. VENABLE: Now is it true or is it not true that in the summer months with low water, dissolved oxygen tends to be lower than in other parts of the year?

MR. WEST: That is correct; low water, high temperatures, low flow, for a constant waste discharge.

DR. VENABLE: So if other conditions remain the same, half the samples that showed less than 4 ppm would not have as significant at other times in the year, other conditions remaining the same?

MR. WEST: That is correct.

CHAIRMAN STEIN: Again let me comment, and this is again for clarification. I agree with what Dr. Venable has said. But as I understand this, this question of pollution control generally does not necessarily deal with averages, but it deals with a critical situation. It doesn't matter, for example, if during the winter you have relatively no bacteria in the water, as during the 2½ summer months when you go swimming, the water is loaded with bacteria. In everything dealing with pollution, I think we are dealing with a critical change.

I think the best example of this would come out of an electrical utility analogy. The utility has to be built such that at 4:00 o'clock on a winter afternoon, when the men are putting on their lights in the offices and the women are putting on their appliances and lights at home, all lights go on. The same thing you are dealing with in a river system, with a critical period, and that critical period generally happens during the hot months, during the summer months, at least in this part of the country. If the damages are substantial, as I understand it, and fish life gets wiped out, you may get some sort of regrowth or coming-back during other periods of the year -- but it never quite comes back.

I think this is typical of a pollution situation, as I understand the situation; and I think, generally speaking, what the people who were making the survey, or engineers who design treatment plants, is they try to make these surveys and make the design with the critical period in mind, so they can tide that over in the same way as someone designing an electric utility has to make their judgment with this critical period in mind.

I don't know. Do you disagree with that, Mr. West?

MR. WEST: We made the survey during this critical period to see whether or not there was pollution.

MR. THOMAN: Let's go off the record here.

(Discussion off the record.)

CHAIRMAN STEIN: The determination, if it is agreeable, is to go ahead. And we will call on Alabama, Dr. Myers.

DR. MYERS: Mr. Chairman and fellow conferees:

Although the Water Improvement Commission, Alabama's official water pollution control agency, did not request this conference, we are of the opinion, based on our investigations and studies, that pollution from sources within Georgia is adversely affecting legitimate water uses of the Chattooga and Coosa Rivers in Alabama.

We first became concerned over possible effects of interstate pollution in 1950, when it was announced that a major industry would be constructed on the Coosa River in Georgia a few miles upstream from the state line. Since that time the Commission has through river studies maintained a check on the effect of wastes from this industry, and frequent conferences with the officials of the Georgia Department of Health and representatives of the industry have been held to determine requirements for water quality control.

Within recent years the uses of the Chattooga and Coosa Rivers in Alabama immediately beyond the state line have been significantly upgraded by major physical changes in the stream. Wastes from sources other than the previously mentioned industry have reportedly affected present day uses of the Coosa River and the Chattooga River.

At this time I would like to ask Mr. Arthur N. Beck, Technical Secretary of the Alabama Water Improvement Commission, to present the Commission's statement to this conference. I would ask that figures and tables referred to in this statement be included in the transcript of the conference.

There are others from Alabama who would like to be heard and at the appropriate time I would appreciate the privilege of presenting these persons.

CHAIRMAN STEIN: Certainly, that will be done.

DR. MYERS: Mr. Beck.

MR. ARTHUR N. BECK: Mr. Chairman and conferees, ladies and gentlemen: We have a report on stream studies of Weiss Lake, the Coosa and Chattooga Rivers, and Cherokee County, Alabama. It is made up of the text and the data, and I would ask, Mr. Chairman, that the full report be included and made a part of the record.

CHAIRMAN STEIN: Without objection, it will be.

Mr. Beck, are you going to summarize this report?

MR. BECK: Mr. Chairman, I can't.

CHAIRMAN STEIN: No. You are --

MR. BECK: I'm going to read it.

CHAIRMAN STEIN: Oh; you are going to read the report.

MR. BECK: If I might. It's about 30 minutes.

CHAIRMAN STEIN: Well, what I was going to say, that the report -- I didn't mean to cut you short. What I mean is that the report will appear intact, as read in the record, with tables, graphs, and so forth.

MR. BECK: Good.

CHAIRMAN STEIN: Thank you.

The following is the "Report on Stream Studies, Weiss Lake - Coosa and Chattooga Rivers" as prepared by the State of Alabama Water Improvement Commission and read by Mr. Beck:

Stream Studies

Weiss Lake - Coosa and Chattooga Rivers

Since 1954 the Alabama Water Improvement Commission has conducted periodic studies of the upper reaches of the Coosa River as it enters Alabama from Georgia. The Coosa River is formed by the confluence of the Oostanaula and Etowah Rivers at Rome, Georgia. The river flows generally westward and enters Alabama approximately 31 miles west of Rome, Georgia. It then continues westward for several miles and turns southwest and south through eastern and central Alabama. The 1954[1] study was conducted during September, while subsequent studies in 1955,[1] 1957,[2] and 1962 have been conducted during the months of August and September. The 1962 study, reported herein, included the Chattooga River which joins the Coosa at Cedar Bluff, Alabama. The studies have been timed for the most part to coincide with low flows anticipated in the stream.

DISCUSSION OF RESULTS OF PREVIOUS STUDIES

The 1954 study was carried out prior to the beginning of operations of a significant source of pollution, Rome Kraft Company, a paper mill located some 15 miles downstream from Rome, Georgia, and approximately 16 miles from the Alabama-Georgia state line. It was intended that the results of this work would serve as a baseline of river conditions prior to the beginning of operation of this source of pollution. Any change in river quality could be evaluated by comparison with results from this study.

During a conference[3] held on January 31, 1951, before construction of the mill began, and attended by representatives of the Mead Corporation (one of the owners of the proposed mill), the mayors of the municipalities of Centre and Gadsden, Alabama, and representatives of the Alabama and Georgia Departments of Public Health, officials of the Mead Corporation assured the group that water in the Coosa River as it entered Alabama would not be unreasonably damaged as a result of the mill's waste.

Stream samples were collected from the river at ferry crossings from Poole s Ferry (Alexis) some five miles from the Alabama-Georgia line, to Hoke's Bluff, approximately seven miles east of Gadsden. Essentially, the 1954 study revealed the river to be relatively normal with only slight effects of organic pollution present as it entered Alabama. A slight depression in the dissolved oxygen profile observed in the Poole's Ferry - Cedar Bluff area was found to have leveled off by the time the river reached the Centre Ferry observation point. This condition is shown graphically in Figure 1.

The results of the 1955 study revealed the condition of the stream following approximately nine months of operation by the source of pollution mentioned above. In addition to those sampling points included in the 1954 study, three intermediate points were added between Poole's Ferry and the state line. The 1955 study showed significant damage with respect to dissolved oxygen to the Coosa River from a point one and one-half miles from the Georgia-Alabama line, the closest point to the state line observed during this study, to Croft's Ferry, a distance of some 53 miles. A profile of the dissolved oxygen values obtained in the 1955 study is shown in Figure 2. A minimum dissolved oxygen value of 7.2 parts per million observed at Poole's Ferry in 1954 may be compared to a minimum value of 3.9 parts per million observed during the 1955 study at the same point. Minimum values as low as 3.5 parts per million were

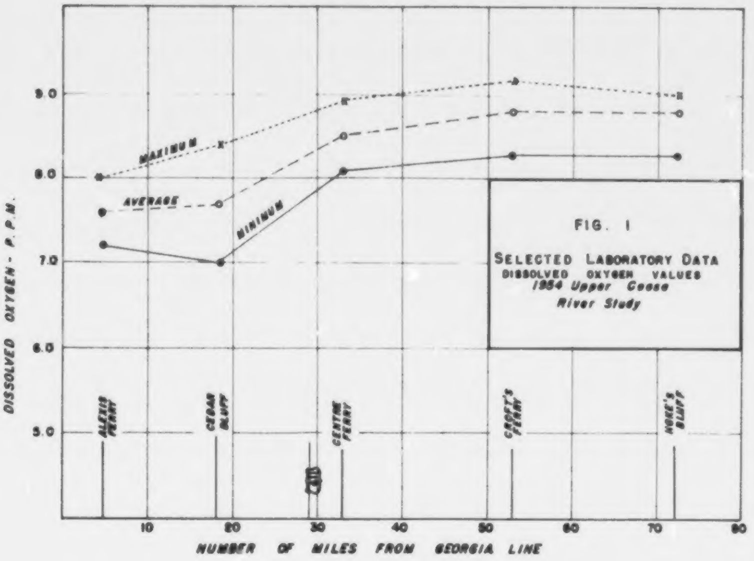


FIG. 1

SELECTED LABORATORY DATA
DISSOLVED OXYGEN VALUES
1954 Upper Coosa
River Study

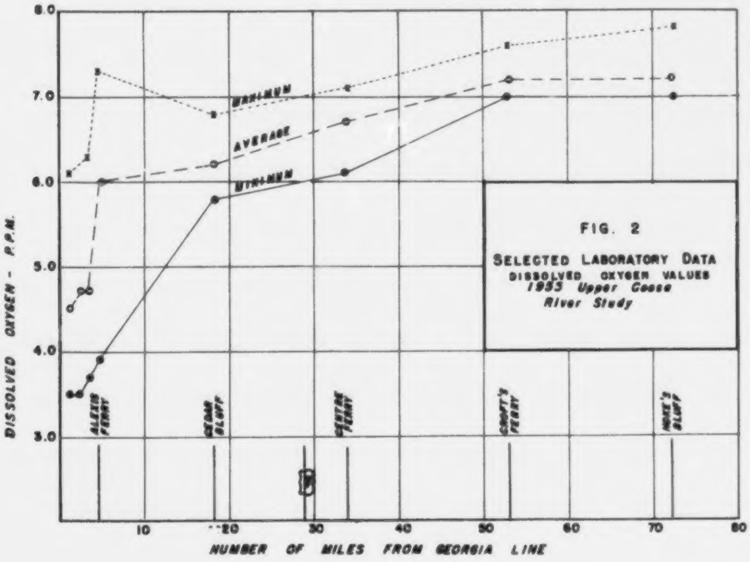


FIG. 2

SELECTED LABORATORY DATA
DISSOLVED OXYGEN VALUES
1953 Upper Coosa
River Study

observed at two stations one and one-half miles and two and one-half miles, respectively, downstream from the state line. Higher color values found during 1955 than in 1954 were attributed to an apparent color caused by increased turbidity values. Other stream characteristics did not appear to be materially affected. Stream flows during this study were substantially lower than those recorded during the 1954 study with extreme daily variations observed as a result of regulation practices at Allatoona Dam on the Etowah River above Rome, Georgia. The Etowah and Oostanaula Rivers join at Rome to form the Coosa.

Further studies of the upper reaches of the Coosa River were performed by the Commission during August and September of 1957. Sampling points during this study were located at substantially the same points as those used in the 1955 study, except that those points between Poole's Ferry and the Alabama-Georgia state line were shifted slightly. An examination of the individual dissolved oxygen determinations obtained during the 1957 study showed no significant change in magnitude at sampling points located in the immediate vicinity of the Alabama-Georgia state line. It was alarming to note, however, that the minimum values showed a marked depression further downstream into Alabama than observed during the 1955 study. A review of the data shows that, in general, the minimum dissolved oxygen values for each of the sampling points downstream from Poole's Ferry was as much as 1.3 parts per million less than observed at comparable points during the 1955 study as far downstream as Fitt's Ferry, approximately 63 miles from the Georgia-Alabama line. Dissolved oxygen values obtained during the 1957 study are shown in Figure 3, while Figure 4 pictures a comparison of the minimum dissolved oxygen values for the 1954, 1955, and 1957 studies.

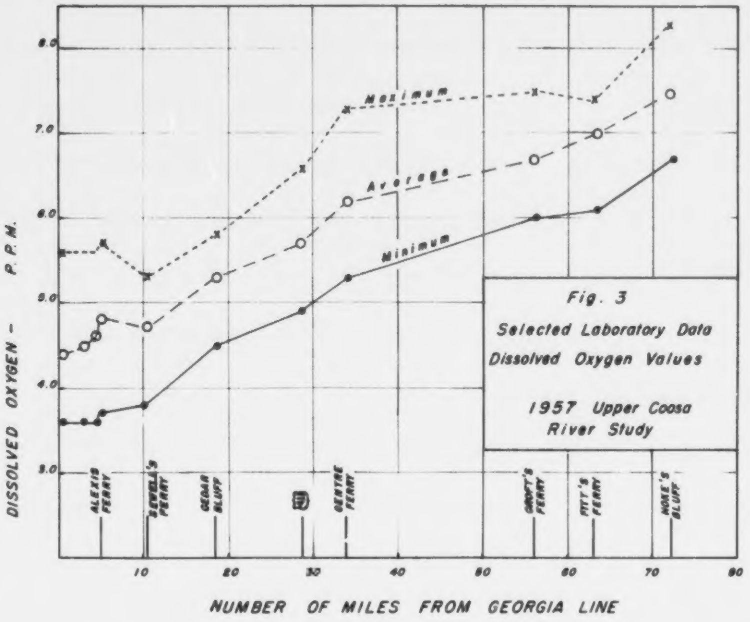


Fig. 3

Selected Laboratory Data

Dissolved Oxygen Values

1957 Upper Coosa River Study

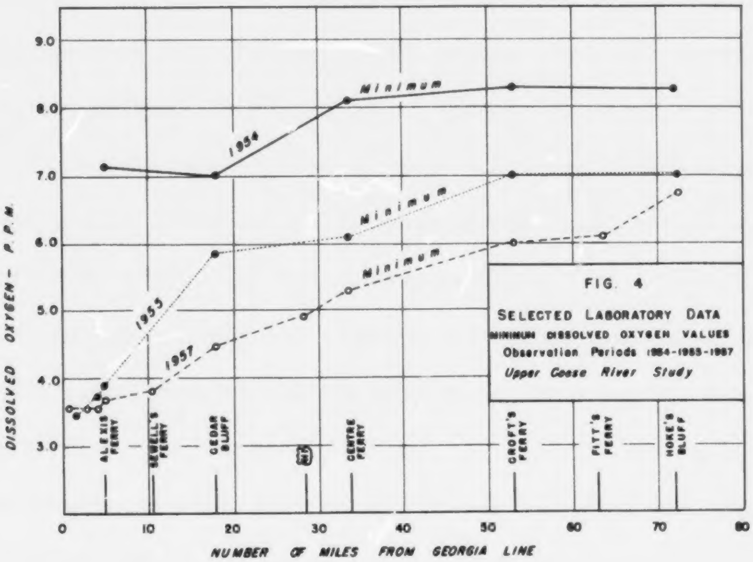


FIG. 4

SELECTED LABORATORY DATA

MINIMUM DISSOLVED OXYGEN VALUES

Observation Periods 1954-1955-1957

Upper Coosa River Study

Following the completion of the 1957 study, a conference was held at the request of the Commission with the Water Quality Division of the Georgia Department of Public Health for the purpose of discussing the findings of the Commission and the condition of the Coosa River. In requesting the conference it was stated, "The situation has developed to the point that positive action must be taken to assure a satisfactory quality of water in the Coosa River within Alabama as was agreed prior to the construction of Rome Kraft Company's plant."[4] It was concluded from the conference that the Alabama Water Improvement Commission would submit to the Water Quality Division of the Georgia Department of Public Health a statement of conditions expected in the Coosa River at the Alabama-Georgia state line. These conditions,[5] transmitted on August 4, 1958, were as follows:

1. A minimum dissolved oxygen concentration of four parts per million and a B.O.D. not in excess of the normal which, on the basis of records, can be stabilized within the river distance between the Alabama-Georgia state line and the Town of Centre, Alabama.
2. The absence of toxic or other materials that will have or are likely to have a deleterious effect, directly or indirectly, upon wildlife, fish, livestock or any established use of the Coosa.
3. The absence of any materials in concentrations likely to affect the potability of the public water supplies of the Town of Centre and City of Gadsden, Alabama.
4. The absence of floating materials of an industrial waste or municipal sewage origin.
5. The absence of materials tending to form sludge banks.

In the letter transmitting the above conditions it was also stated:

"The above conditions are considered applicable only to the Coosa River with unimpeded flow between the Alabama-Georgia state line and Gadsden, Alabama. Completion of a dam now under construction near

Leesburg, Alabama will create a reservoir with a high recreational potential and the situation must be re-evaluated before then. It should suffice, at this time, to state that conditions affecting recreational uses as fishing, boating and water sports will be up-graded as necessary to protect these interests."

Further correspondence[6,7] with officials of the Georgia Department of Public Health in November 1961 and January 1962 stated, in part, "A series of events occurring recently on the Chattooga and Coosa Rivers as they enter Alabama from Georgia together with persistent complaints of pollution of these streams from residents of Cherokee County, Alabama, have created a situation with which we are quite concerned." Fish kills occurring on the Coosa and Chattooga Rivers as a result of pollution in Georgia were cited and action of the Alabama Legislature requesting investigations and remedial action in the matter was brought to the attention of Georgia officials in the correspondence. The letter of November 21, 1961, concluded as follows, "In view of the situations of pollution which have been described in this letter and which have undoubtedly been created by the discharge of wastes within Georgia, we respectfully request that your department take such action as may be necessary to control pollution of Chattooga and Coosa Rivers to the point that the water of these rivers as they enter Alabama are of a quality compatible with water uses in Alabama."

1962 STUDY

An extensive study of the upper reaches of the Coosa and Chattooga Rivers during August and September 1962 was brought about by a number of various factors. These factors include:

1. The need for a determination of effects on river conditions as a result of the construction of Weiss Dam and Lake which was completed in 1961.

2. Determination of changes, if any, in river conditions as a result of the construction of waste treatment facilities at Rome Kraft Company together with major plant expansions completed since the Commission's 1957 study.

3. The occurrence of fish kills in Chattooga River investigated by the Commission's staff. The staff investigated one kill in November 1961 and another during June of 1962. During the course of these investigations, residents living near the river in Alabama reported other such kills as occurring periodically in the past. One minor fish kill in the Coosa during October 1961 had also occurred.

4. The receipt of numerous complaints and petitions from individuals and organizations in the area, protesting pollution of the Coosa and Chattooga Rivers and its effect on recreational uses of the new reservoir.

5. Passage of Senate Joint Resolution 1 adopted by the Legislature of Alabama on September 15, 1961, memorializing the Water Improvement Commission to "investigate fully the cause or causes of pollution of Weiss Lake, and to take such action by the issuance of orders or otherwise as may be necessary to control such pollution of Weiss Lake."

6. Passage of House Joint Resolution 9, approved by the Legislature of Alabama on September 14, 1961, and, in essence, comparable to the above resolution.

The construction of Weiss Dam and Reservoir was completed in 1961. The dam, constructed by the Alabama Power Company, is located on the Coosa

River near Leesburg, Alabama, approximately 30 miles from the state line. In the construction of the power generating facility a diversion canal leading to a forebay was built with the power house located at the lower end of the forebay. Three generators at the power house have a total capacity of 87,750 K.W. The normal operating practice is to generate from 7:00 A.M. to 4:00 P.M. on weekdays with the 24-hour flow of the river being released during this period. The lake elevation is maintained at 564 feet from April through August and is then gradually drawn down until it reaches 558 feet in January, where it is normally maintained until April. The reservoir has a surface area of approximately 31,000 acres and a shoreline of about 447 miles at the pool elevation of 564 feet. The lake extends about 52 miles upstream to Mayo's Bar near Rome, Georgia. The largest of several tributary streams entering the reservoir in Alabama are the Chattooga and Little Rivers. Both flow southwestward out of Georgia and enter the reservoir from the north side near Cedar Bluff, Alabama.

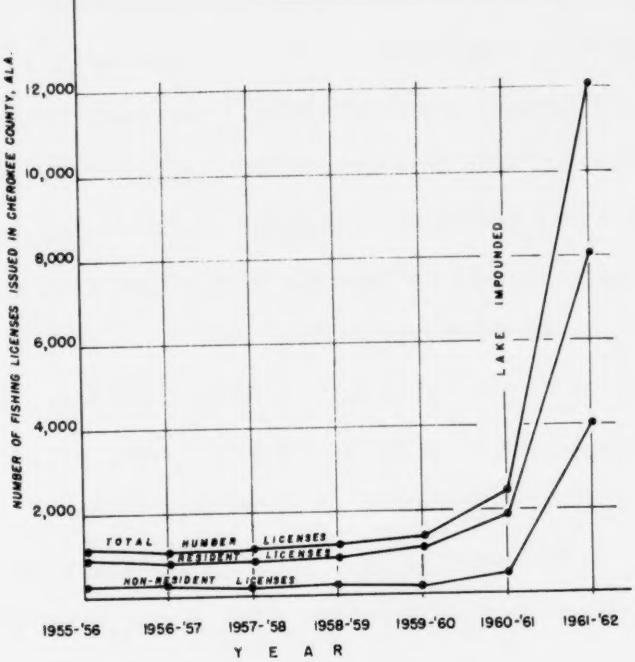
The area, before inundation, consisted mostly of level fields which became large shallow areas when the lake was filled, with the only appreciable depth being in the old river channels.

The lake is being rapidly developed as a recreational area with a considerable number of waterfront cottages being constructed. According to records of the Alabama Department of Health, 27 subdivisions consisting of 699 homesites have been approved for development along the shoreline of Weiss Lake since August 1960.

Some evidence of the interest and appeal generated as a result of the construction of the reservoir may be seen in Figure 5, in which the number

FIG 5

NUMBER FISHING LICENSES ISSUED IN CHEROKEE COUNTY BEFORE AND AFTER IMPOUNDMENT OF WEISS LAKE.



of fishing licenses issued in Cherokee County before and during the period since the lake has been impounded is shown. It is interesting to note that in the year 1958-59, the year before the impoundment was completed, 1,218 fishing licenses were issued in Cherokee County, of which 282 were to non-residents. In the year 1961-62, during only part of which the impoundment existed, the total number of fishing licenses issued in Cherokee County jumped to 12,107, a ten-fold increase, with 4,012 of these being issued to non-residents of the state. A large percentage of the non-resident licenses was issued to residents of Georgia. During the same two-year period mentioned above, boat registrations in Cherokee County more than doubled.

The lake also serves as the source of public water supply for the Town of Cedar Bluff. The water intake for the town's water supply is located just north of the highway bridge crossing Alabama Highway No. 9 at Cedar Bluff. A modern water treatment plant consisting of chemical coagulation, settling, rapid sand filtration, and chlorination was completed during 1961.

Since the completion of the 1957 studies of the upper Coosa River, the Rome Kraft Company has substantially expanded its manufacturing operations. In conjunction with this expansion in production, the company also constructed a new system for treatment of its liquid wastes. Critical dissolved oxygen levels accompanied by a slight fish kill in Alabama occurred in the Coosa River during October 1961 below Rome Kraft Company as the result of an accidental loss of untreated wastes. These developments, together with the construction of Weiss Lake, definitely indicated the need of a new determination of river conditions.

The first report of fish kills in the Chattooga River was received by the Commission in November 1961. An investigation of this kill revealed it to be a major one originating in Georgia and affecting all species of fish for some distance in Alabama. During the course of the investigation, residents of the area in Alabama reported that periodic kills had been experienced in the stream from sources within Georgia during the past several years. A second kill in the Chattooga caused by sources in Georgia was investigated by a member of the Commission's staff during June 1962 and can also be described as a severe kill.

Complaints of pollution of the Coosa and Chattooga Rivers have been registered with the Commission in the form of letters and petitions signed by individuals and in the form of resolutions passed by various groups in the area. A petition bearing the signatures of over 800 people under the heading of "We, the undersigned residents of Cherokee County, Alabama, protest the pollution of the Etowah, Coosa, and Chattooga Rivers" is on file in the offices of the Commission. Copies of resolutions passed by the following groups or organizations are also on file: Cedar Bluff Chamber of Commerce, Cedar Bluff, Alabama; Cherokee County Industrial Committee, Centre, Alabama; Cherokee County Board of Revenue, Centre, Alabama; City Council of the City of Centre, Alabama; Town Council of the Town of Cedar Bluff, Alabama; Town Council of Leesburg, Alabama. The above resolutions are reproduced in their entirety and are included in the appendix of this report.

In unusual actions, both the Senate and House of the Alabama Legislature during special session, 1961, passed joint resolutions deploring pollution of Weiss Lake and requesting remedial action. Senate Joint Resolution No. 1, introduced by Mr. Godfrey from Cherokee County, stated:

> Memorializing the Water Improvement Commission to investigate the cause of pollution of Weiss Lake, Cherokee County, and take action necessary to control such pollution.
>
> WHEREAS the municipality of Trion, Georgia is engaged in dumping raw sewage in tributary streams that flow through or empty in Weiss Lake, Cherokee County, and certain industries, including Rome Craft (sic) at Coosa, Georgia, Riegel Textile Corporation, at Trion, Georgia, and certain iron ore processing plants near Cartersville are also contributing to the pollution of Weiss Lake; be it
>
> RESOLVED BY THE LEGISLATURE OF ALABAMA, BOTH HOUSES CONCURRING,
>
> That the Water Improvement Commission of the State of Alabama be memorialized to investigate fully the cause or causes of pollution of Weiss Lake, and to take such action, by the issuance of orders or otherwise, as may be necessary to control such pollution of Weiss Lake.
>
> RESOLVED FURTHER, That the Secretary be directed to send a copy of this resolution to

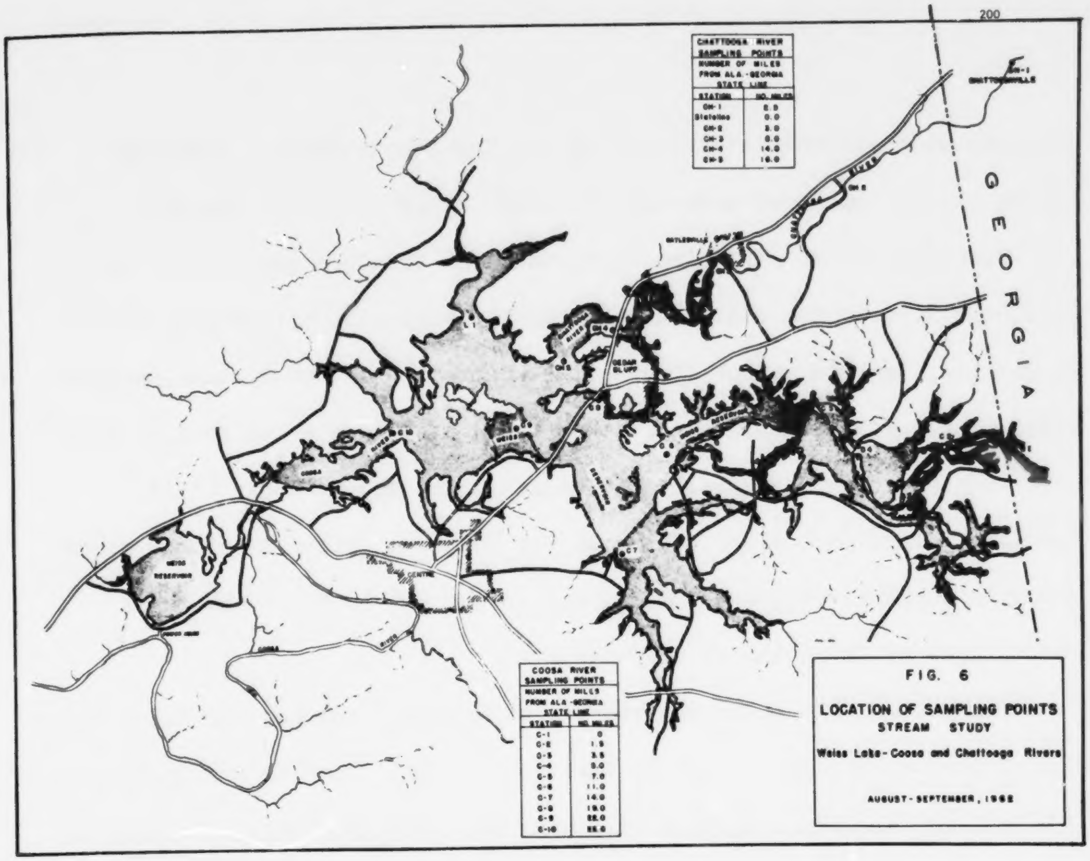
> Dr. D. G. Gill, State Health Officer, ex officio chairman of the Water Improvement Commission.

House Joint Resolution No. 9 was introduced by Mr. Meade of Cherokee County and stated:

> WHEREAS, pollution originating in the State of Georgia is entering the State of Alabama by means of streams and rivers flowing from Georgia into Alabama, particularly through the waters of the Etowah River, Ostanaula (sic) River, and the Chattooga River; and
>
> WHEREAS, there is no means provided under the laws of this State to alleviate or prevent pollution originating outside of the State; and
>
> WHEREAS, said pollution is detrimental and harmful to the interest of the people of the State of Alabama and particularly to the fish in the public waters of this State.
>
> NOW, THEREFORE, BE IT RESOLVED BY THE HOUSE OF REPRESENTATIVES OF THE STATE OF ALABAMA, THE SENATE CONCURRING, that the above-cited pollution of the public streams of the State of Alabama constitutes an intolerable condition and one that is greatly against the public interest of this State, that the Department of Public Health, the Water Quality Council and the Water Resources Commission of the State of Georgia and the Department of Health, Education and Welfare of the Federal Government are hereby notified and requested to take whatever steps and actions necessary to prevent any further pollution from entering the waters of the State of Alabama from sources located in the State of Georgia.

Stream Sampling Points and Procedure

The 1962 study included some 16 sampling points in the Weiss Lake area. The locations of these points may be seen on the accompanying map, Figure 6. Ten sampling points were established on the Coosa River starting at the Alabama-Georgia line and spaced one and one-half to four miles apart downstream for a distance of about 25 miles, the lower point being about four miles above Weiss Dam. The points were located to coincide, in


GEORGIA
CHATTOOGAVILLE
CHATTOOGA RIVER
GAYLESVILLE
CEDAR BLUFF
COOSA RIVER
WEISS RESERVOIR
CENTRE
CH-1
CH-2
C-7

CHATTOOGA RIVER SAMPLING POINTS NUMBER OF MILES FROM ALA.-GEORGIA STATE LINE	
STATION	NO. MILES
CH-1	2.0
Stateline	0.0
CH-2	3.0
CH-3	8.0
CH-4	14.0
CH-5	16.0

COOSA RIVER SAMPLING POINTS NUMBER OF MILES FROM ALA.-GEORGIA STATE LINE	
STATION	NO. MILES
C-1	0
C-2	1.5
C-3	3.5
C-4	5.0
C-5	7.0
C-6	11.0
C-7	14.0
C-8	19.0
C-9	22.0
C-10	25.0

FIG. 6

LOCATION OF SAMPLING POINTS
STREAM STUDY
Weiss Lake-Coosa and Chattooga Rivers

AUGUST-SEPTEMBER, 1962

general, with the points included in the previous studies. Sampling points in the impounded area were located in the old river channel.

Sampling points were also established at four bridges across the Chattooga River. The upstream point was located at a bridge near Chattoogaville, Georgia, about three miles upstream from the Alabama-Georgia state line. Other sampling points on the Chattooga were at bridges four miles northeast of Gaylesville, at Gaylesville, and at Cedar Bluff. Sampling points were also located in the Chattooga River embayment about one mile northwest of Cedar Bluff, and in the Little River embayment about three miles northwest of Cedar Bluff.

Collection of samples was started on August 6 and was continued daily Monday through Friday through September 27, 1962. Samples from stations C-1 through C-9 were collected 36 times; CH-1 through CH-4, 38 times; and stations C-10, CH-5, and L-1, 32 times. Samples were generally collected during the morning hours at a depth of approximately three feet. Analyses performed on all samples included dissolved oxygen, temperature, 5-day biochemical oxygen demand, pH value, turbidity, and total alkalinity. The azide modification of the Winkler method was used for the dissolved oxygen tests. All laboratory determinations were performed in accordance with those procedures contained in Standard Methods for the Examination of Water and Wastewater, 11th Edition.

Discussion of Results of 1962 Study

Coosa River

Laboratory results obtained from stations C-1 through C-11 are shown in Tables 1 through 11 in the back of the report. Average, maximum, and minimum values for each determination at the various sampling points are included in the tabulated data. Table C-11 lists the results of determinations made to determine the presence of total iron at selected points.

Laboratory data collected on the Coosa River portion of the 1962 study shows continued degradation of the Coosa River in respect to dissolved oxygen. Average, maximum, and minimum values for each sampling point for this study are pictured graphically in Figure 7. Comparisons of minimum values for the 1954, 1955, 1957, and 1962 studies are shown graphically in Figure 8. Similarly, comparisons of average values for the same periods are shown in Figure 9. While the average values in the vicinity of the state line in 1962 were found to be comparable to previous studies, perhaps slightly lower, it was observed that the stream recovered more rapidly than during previous studies. On the other hand, the minimum values observed in the vicinity of the state line during 1962 were found to be substantially lower than any of the previous studies and persisted further downstream than during any previous study. Critical dissolved oxygen values were found on occasions as far downstream as Cedar Bluff, a distance of 19 miles from the state line. The daily dissolved oxygen values obtained at the sampling point located at the state line are shown in Figure 10. The per cent of samples at each sampling point containing less than 4.0 ppm of dissolved oxygen is shown in Figure 11. It can be seen that 25 per cent of all samples collected as far downstream as Sewell's Ferry, eleven miles from the state line, contained less than the above-mentioned 4.0 ppm of dissolved oxygen. Similarly, more than fifty per cent of samples collected from the river for a distance of 3.5 miles from the state line contained less than 4.0 ppm of dissolved oxygen.

A profile of the results of the biochemical oxygen demand (B.O.D.) tests on the Coosa for each station is shown in Figure 12. While the

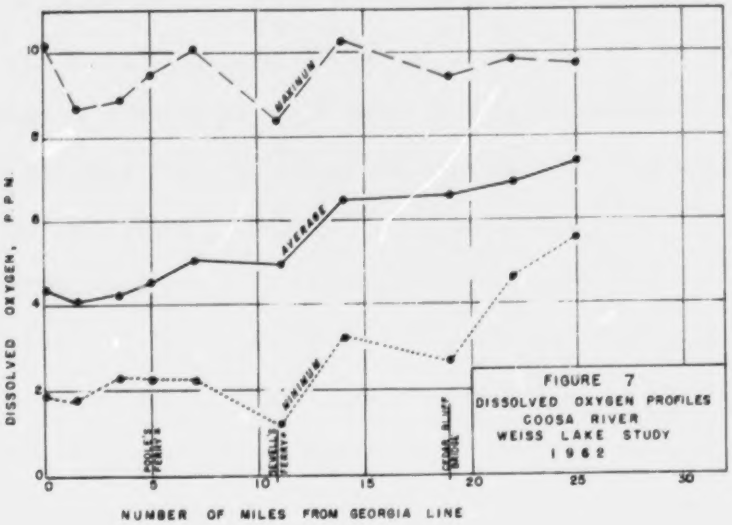


FIGURE 7
DISSOLVED OXYGEN PROFILES
COOSA RIVER
WEISS LAKE STUDY
1962

ABANDONED*

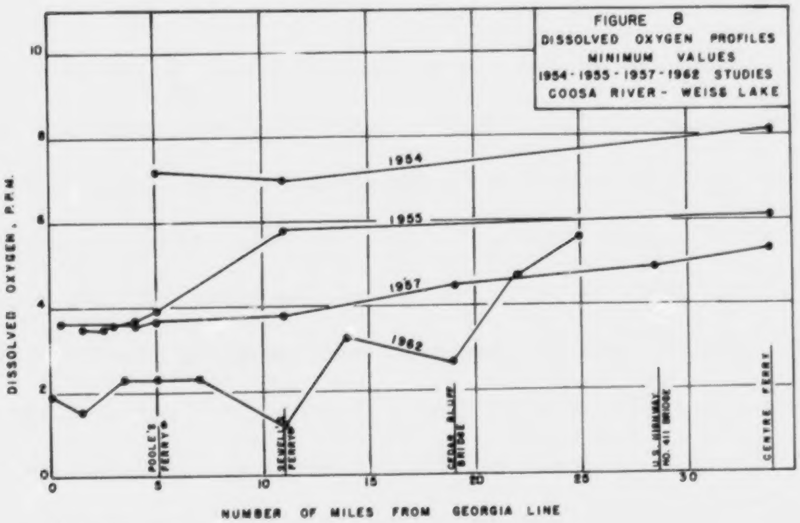


FIGURE 8
DISSOLVED OXYGEN PROFILES
MINIMUM VALUES
1954 - 1955 - 1957 - 1962 STUDIES
COOSA RIVER - WEISS LAKE

*ABANDONED

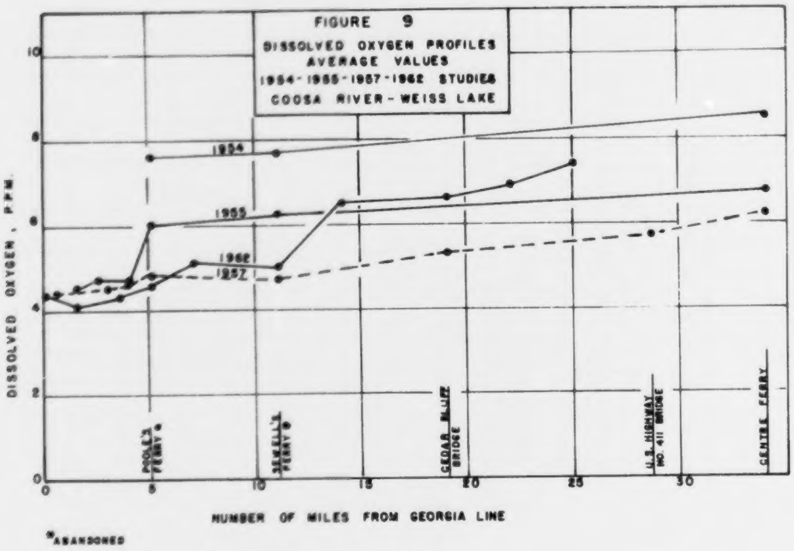


FIGURE 9
DISSOLVED OXYGEN PROFILES
AVERAGE VALUES
1954-1955-1957-1962 STUDIES
COOSA RIVER - WEISS LAKE

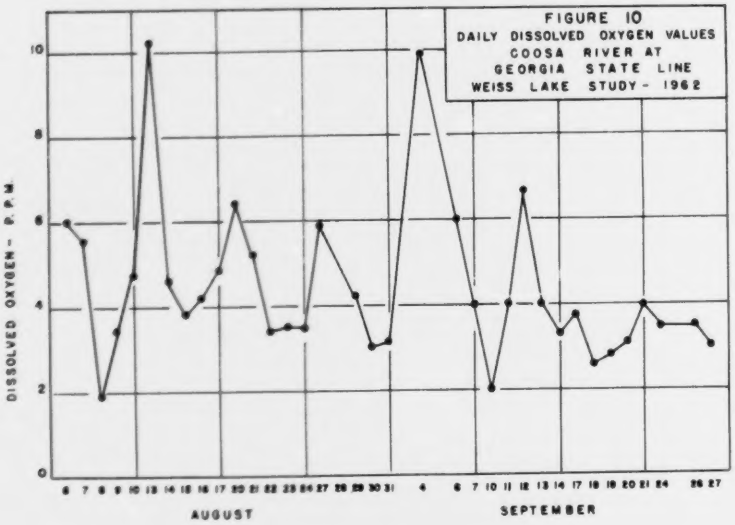


FIGURE 10
DAILY DISSOLVED OXYGEN VALUES
COOSA RIVER AT
GEORGIA STATE LINE
WEISS LAKE STUDY - 1962

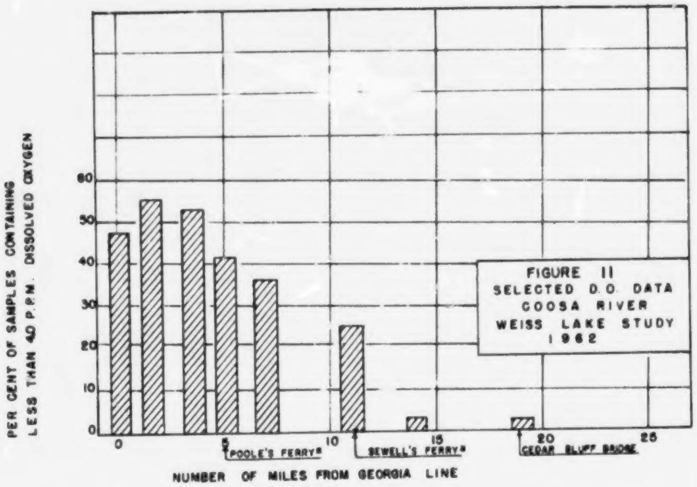


FIGURE 11
SELECTED D.O. DATA
COOSA RIVER
WEISS LAKE STUDY
1962

ABANDONED*

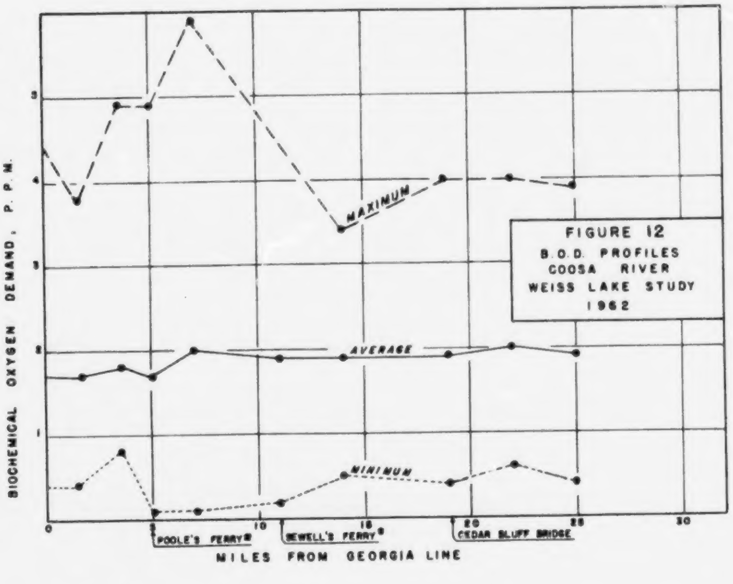


FIGURE 12
B.O.D. PROFILES
COOSA RIVER
WEISS LAKE STUDY
1962

ABANDONED*

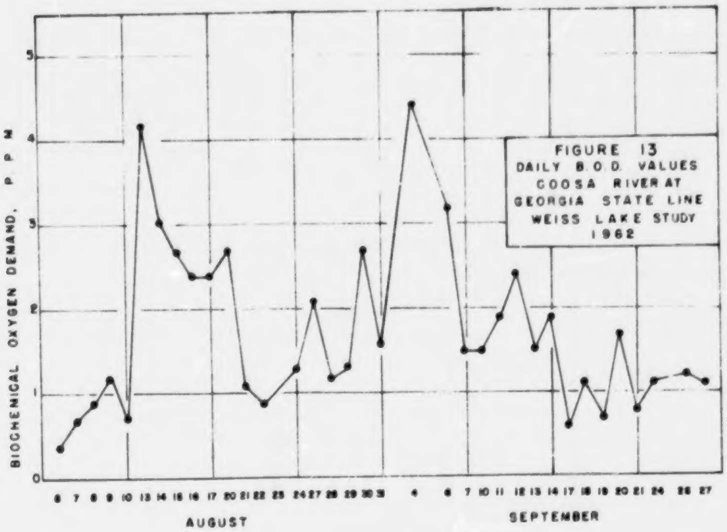


FIGURE 13
DAILY B.O.D. VALUES
COOSA RIVER AT
GEORGIA STATE LINE
WEISS LAKE STUDY
1962

average values indicate a relatively stable river condition, maximum values as high as 5 to 6 ppm are indicative of the fact that the river has not regained a balanced condition by the time it reaches Alabama. Daily fluctuation of the B.O.D. found at the state line is shown in Figure 13.

Prompted by complaints of turbid and discolored waters in the Coosa River, samples were examined with respect to turbidity. The results are shown graphically in Figures 14 and 15. As to be expected, the turbidity decreased from values as high as 50 ppm at the state line to minimum values less than 10 ppm in the lower reaches of Weiss Lake where the velocity of flow lessens and quiescent conditions exist.

Progressively higher pH values observed at downstream points from the state line are no doubt due to a natural phenomenon and may be attributed

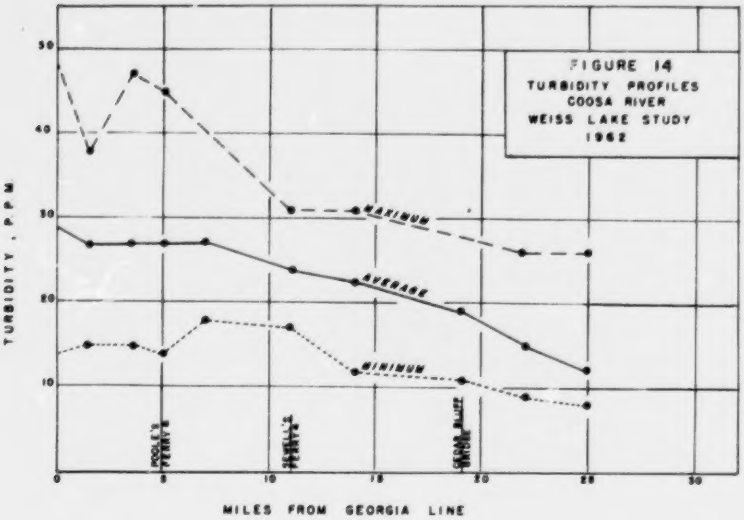


FIGURE 14
TURBIDITY PROFILES
COOSA RIVER
WEISS LAKE STUDY
1962

ABANDONED*

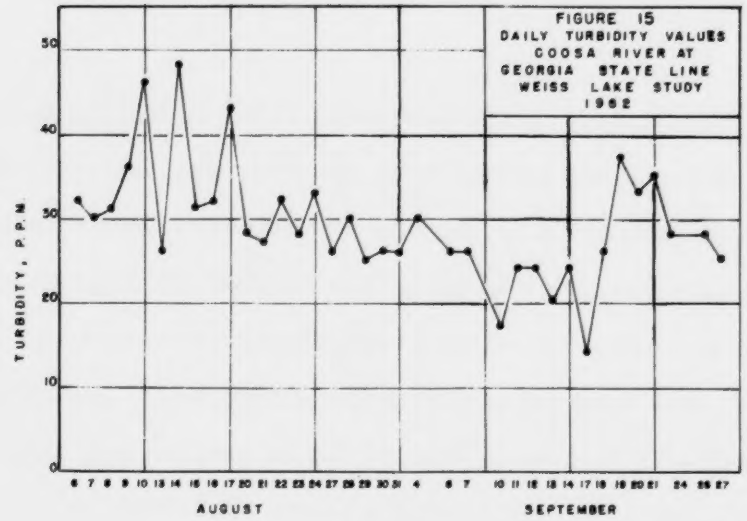


FIGURE 15
DAILY TURBIDITY VALUES
COOSA RIVER AT
GEORGIA STATE LINE
WEISS LAKE STUDY
1962

to increased algal activity in the lake. Algae utilize carbon dioxide (photosynthesis) in their life cycle which results in a raising of the pH. Values of pH above 8.0 are produced by a photosynthetic rate that demands more carbon dioxide than is furnished by respiration and decomposition.

Stream flows observed during the study were considered representative of normal late summer and early fall flows during which times streams in this area are at the lowest of the year. Daily variations as a result of the operation of power generating facilities at Allatoona and Weiss Dams were evident. Daily stream flows shown in the tables were furnished by the U. S. Geological Survey who computed them from actual measurements at upstream points.

Chattooga River

Laboratory results obtained from stations CH-1 through CH-5 on the Chattooga River are shown in Tables CH-1 through CH-5. Results of samples collected from station L-1 in the Little River embayment are included in Table L-1. Average, maximum, and minimum values for each determination at the various sampling points are included in the tabulated data.

Average, maximum, and minimum dissolved oxygen values obtained from the various sampling points on the Chattooga River are shown graphically in Figure 16. As was true on the Coosa, excessive organic pollution discharged to the Chattooga in Georgia has reduced the dissolved oxygen levels to critical levels at and below the Alabama-Georgia state line. The first sampling point in Alabama was located at a county highway bridge some three miles inside Alabama, and over 25 per cent of all samples collected contained less than 4.0 ppm of dissolved oxygen. At the next observation point, which was near Gaylesville, 8.5 miles from the state line, over 60 per cent of

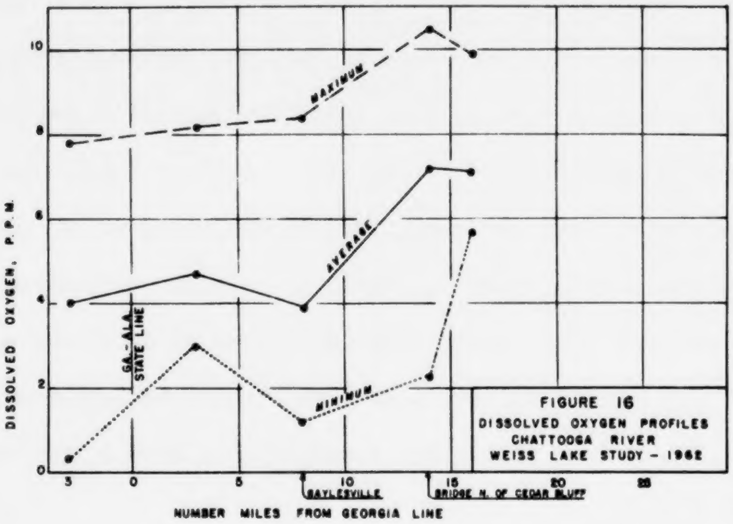


FIGURE 16
DISSOLVED OXYGEN PROFILES
CHATTOOGA RIVER
WEISS LAKE STUDY - 1962

samples collected contained less than 4.0 ppm of dissolved oxygen. The decrease in dissolved oxygen at this point probably can be attributed to the retardation in velocity and the change in character of the stream due to backwater effects of Weiss Lake. The Chattooga River changes from a free flowing stream a short distance upstream of Gaylesville. The frequency of occurrence of dissolved oxygen levels less than 4.0 ppm is shown in Figure 17. The daily dissolved oxygen values observed at station CH-2, three miles inside Alabama, are shown in Figure 18.

Average, maximum, and minimum biochemical oxygen demand (B.O.D.) values for the various stations are shown in Figure 19 and reflect conditions indicative of an unbalanced stream. Daily B.O.D. values observed at station CH-2 are shown in Figure 20 and also reveal this fact.

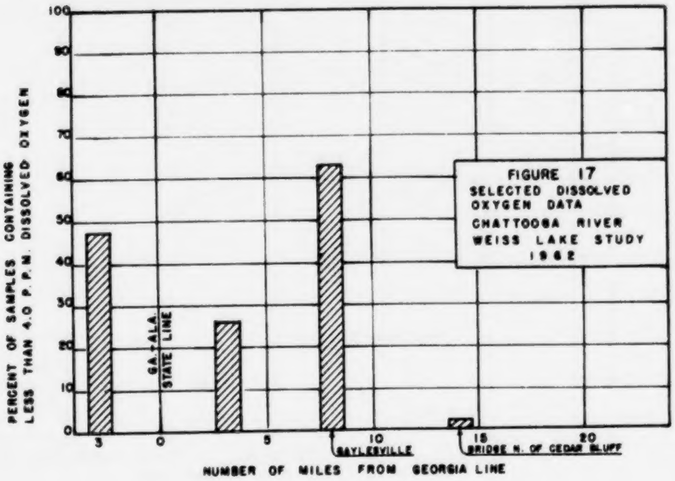


FIGURE 17
SELECTED DISSOLVED OXYGEN DATA
CHATTOOGA RIVER
WEISS LAKE STUDY
1962

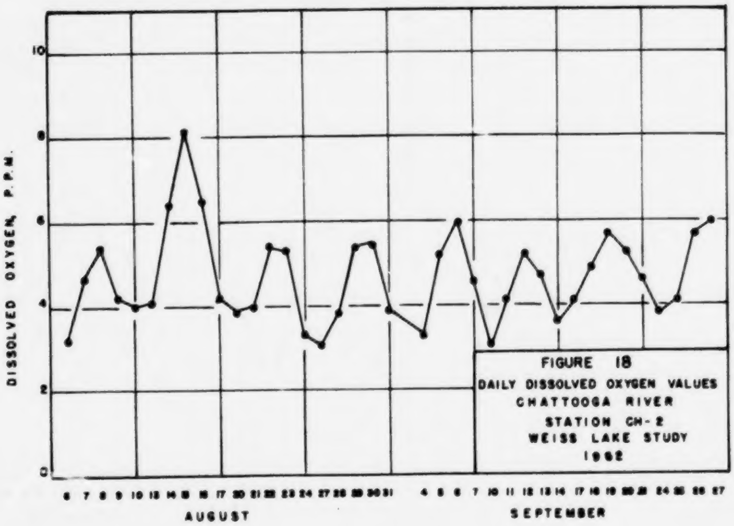


FIGURE 18
DAILY DISSOLVED OXYGEN VALUES
CHATTOOGA RIVER
STATION CH-2
WEISS LAKE STUDY
1962

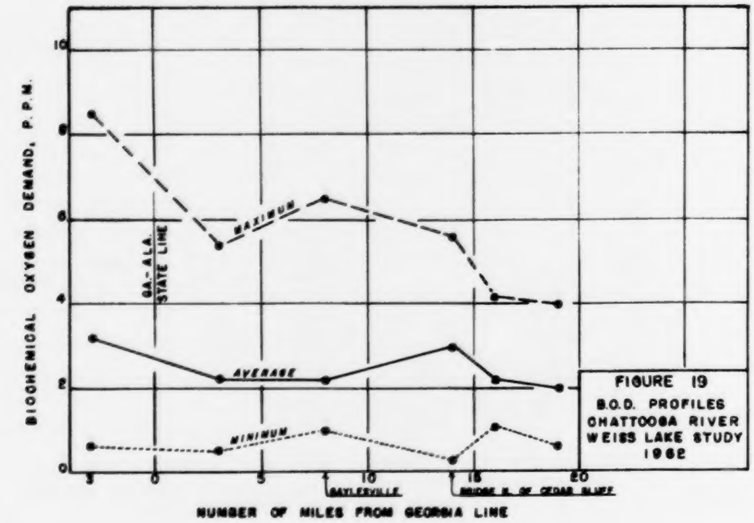


FIGURE 19
B.O.D. PROFILES
CHATTOOGA RIVER
WEISS LAKE STUDY
1962

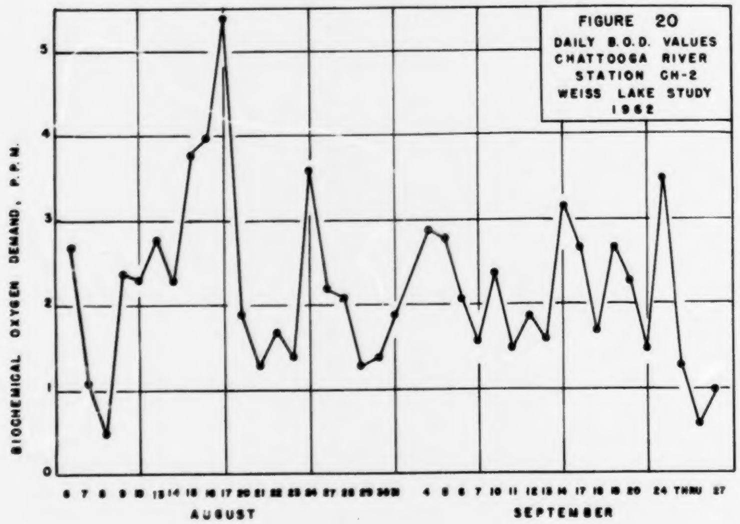


FIGURE 20
DAILY B.O.D. VALUES
CHATTOOGA RIVER
STATION CH-2
WEISS LAKE STUDY
1962

Elevated pH values together with abnormally high total alkalinity values at station CH-2 definitely indicate the presence of industrial wastes. In 21 of the 38 samples collected from this point, the presence of significant phenolphthalein alkalinity concentrations was found, which is further indication of the presence of industrial wastes. Pollution of this type was evident on occasions as far downstream as the bridge crossing north of Cedar Bluff, some 14 miles below the state line.

SUMMARY

The Water Improvement Commission has conducted studies of the Upper Coosa River in Alabama in 1954, 1955, 1957, and again in 1962. The 1962 study was expanded to include the Chattooga River in Alabama. These studies have indicated the presence of gross pollution from sources within Georgia that is affecting both the Coosa and Chattooga Rivers, particularly with respect to dissolved oxygen. Each succeeding year since 1954 has seen a further depression in minimum dissolved oxygen values in the Coosa River for increasingly further distances into Alabama. Other detrimental effects have also been found. Two major fish kills on the Chattooga in Alabama caused by discharge of pollution in Georgia have been investigated by Commission personnel. A slight kill occurred on the Coosa during October 1961 and was investigated by the Commission. It is significant to point out that more than 50 per cent of samples collected on the Coosa for 3.5 miles inside Alabama contained less than 4.0 ppm of dissolved oxygen. On the Chattooga at Gaylesville, some 8.5 miles below the state line, over 60 per cent of samples collected contained less than 4.0 ppm of dissolved oxygen.

Bacteriological tests to determine the presence and extent of sewage contamination in the two streams were not made. The results of such tests, however, would have been highly desirable in light of the fact that the municipalities of Trion and Summerville discharge their sanitary sewage untreated into the Chattooga, and likewise the city of Rome discharges its sanitary waste untreated into the Coosa. It can be said, however, that in view of the proximity of such discharges to Weiss Lake this practice is a potential menace and may render the waters unsuitable for water contact sports and associated recreational uses.

Many of the complaints registered with the Commission have referred to iron and other mineral mining operations in Georgia as contributing an off color or discoloration to the upper reaches of the Coosa River and Weiss Lake. The actual measurement and expression of such pollution in units is extremely difficult. An evaluation of pollution of this type is probably best done by visual observation, but even this method has obvious shortcomings. It is believed, however, that this form of pollution is real and is affecting the use and value of lake front property to some extent. The presence of iron in the waters of Weiss Lake could also present difficulties in production of a satisfactory water at the Cedar Bluff water plant. Some "red-water" complaints received from residents of Cedar Bluff during the fall of 1962 were tentatively attributed to iron in the river water.

Developments occurring during recent years have compounded the pollution problem on the Coosa River in Cherokee County, Alabama. These include major expansion of manufacturing operations at Rome Kraft Company and changes in characteristics of the Coosa River resulting from the construction of Weiss Dam and Lake.

Extensive studies of the Upper Coosa River have resulted in the accumulation of a considerable amount of data and information. While less information is available on the Chattooga River, the results of the comprehensive study of 1962, together with the occurrence of at least two fish kills, definitely indicate the presence of gross pollution. On the basis of the information available, there is little doubt but that pollution from industrial sources has caused significant damage to the fishery of both streams and if permitted to continue, further damage may occur. Other forms of pollution, including the discharge of untreated sewage and discolored wastes from mining operations, pose a definite threat to the development and use of Weiss Lake for recreational purposes.

References

1. Stream Study, Coosa River, Hoke's Bluff to Georgia Line, 1954-1955, Water Improvement Commission.

2. Stream Study, Upper Coosa River, Hoke's Bluff - Georgia Line, August - September 1957, Water Improvement Commission.

3. Memorandum of Conference Relating to the Proposed Location of a Pulp Mill on the Coosa River at Coosa, Georgia, January 30, 1951. Prepared by Mr. Arthur N. Beck, Technical Secretary, Water Improvement Commission, dated January 31, 1951.

4. Official Communication, from Mr. Arthur N. Beck, Technical Secretary, Water Improvement Commission, to Mr. W. H. Weir, Director, Water Quality Division, Georgia Department of Public Health, dated July 7, 1958.

5. Official Communication, from Mr. Arthur N. Beck, Technical Secretary, Water Improvement Commission, to Mr. W. H. Weir, Director, Water Quality Division, Georgia Department of Public Health, dated August 4, 1958.

6. Official Communication, from Dr. D. G. Gill, Chairman, Water Improvement Commission, to Dr. John H. Venable, Director, Georgia Department of Public Health, dated November 21, 1961.

7. Official Communication, from Dr. D. G. Gill, Chairman, Water Improvement Commission, to Dr. John H. Venable, Director, Georgia Department of Public Health, dated January 18, 1962.

APPENDIX

Resolutions on File with Water Improvement Commission

1. Cedar Bluff Chamber of Commerce, Cedar Bluff, Alabama.
2. Cherokee County Industrial Committee, Centre, Alabama.
3. Cherokee County Board of Revenue, Centre, Alabama.
4. City Council of the City of Centre, Alabama.
5. Town Council of the Town of Cedar Bluff, Alabama.
6. Town Council of Leesburg, Alabama.

C-O-P-Y

Cedar Bluff Chamber Of Commerce
CEDAR BLUFF, ALA.

RESOLUTION

WHEREAS, the muddy condition of the water in the Coosa River is detrimental to the developement of our area.

WHEREAS, the muddy water in the lake, lowers the value of the land around the lake.

WHEREAS, due to the loss of a large farm income, caused by water covering the land, it is imperative that we do everything possible to develop our shore lines in order to maintain a thriving economy in our area.

WHEREAS, it is our understanding that this mud pollution, of the water in the Coosa River, is caused by ore washing in Bartow County, Georgia.

THEREFORE, BE IT RESOLVED BY THE CEDAR BLUFF CHAMBER OF COMMERCE, THAT: Whatever steps that are necessary, be taken in order to get this deplorable condition corrected.

BE IT FURTHER RESOLVED THAT: The secretary of this organization be authorized to send a copy of this resolution to the Department of Health of the State of Georgia, and to any other department, organization, or individual that, to the board of directors, would seem feasable.

CEDAR BLUFF CHAMBER OF COMMERCE

/S/ W. K. Summers
W. K. Summers, President

/S/ J. L. McCarley
J. L. McCarley, Vice-President

/S/ S. J. Wilson
S. J. Wilson, Secretary

"BUILDING FOR A BETTER TOMORROW"

C-O-P-Y

CHEROKEE COUNTY INDUSTRIAL COMMITTEE

WAlnut 7-4431 103 FIRST AVE. SOUTH CENTRE, ALABAMA

August 15, 1961

Officers:

James H. Jones, Chairman
Retired
M. D. Hays, Vice-Chairman
President, Centre Mfg. Co.
J. L. McCarley, Treasurer
President, Cedar Bluff Bank
Joe Shaw, Jr., Secretary
Publisher, Cherokee County Herald
W. T. Dickey, Jr., Staff Director

Directors:

J. B. Burkhalter, Owner
Burkhalter Chevrolet Co.
John E. Chesnut, Partner
C & S Hardware Co.
John H. Ellis, Owner
Jitney Jungle Super-Market
John H. Garrett
Real Estate
F. C. Ingram, Owner
F. C. Ingram Store
Glover Johnson, Chairman Board
Cherokee County Hospital
Floyd King, Partner
King Oil Co.
Dr. W. H. Powell, Mayor
City of Centre
Hugh Reed, Jr.
Reed & Reed, Attorneys-at-Law
Dewey H. Singleton, Partner
Singleton-Leath Construction Co.
J. Ben Steed, Vice President
Farmers & Merchants Bank
W. K. Summers, Owner
Cedar Bluff Lumber Co.
Mary George Jordan Waite, President
Farmers & Merchants Bank
Hugh Webb, Chairman
Cherokee County Board of Revenue
Olen S. Williamson,
Executive Vice President,
Cherokee County Bank

RESOLUTION

TO WHOM IT MAY CONCERN:

Whereas for the past few years, Rome Kraft Co., the City of Rome, Ga., and the ore mining interests of Bartow County, Georgia have been emptying waste, garbage and mud into the Oostanaula and the Etowah Rivers, which come together to make the Coosa River below Rome, to the extent that it constitutes a polution hazard that is jeopordizing fishing and killing many, and whereas the Rome Kraft Co., has spent a considerable amount of money correcting their polution problem, and whereas the City of Rome is now working to the end that they will soon correct their polution problem, and whereas, the mining interests in Bartow County, Ga., on the Etowah River are reluctant to recognize their responsibility in alleviating their hazard in the interest of all concerned, and whereas, since Weiss Dam has been constructed, creating Weiss Lake which causes the water to eddy from Rome, Ga., to Weiss Dam making this polution problem a greater hazard, and whereas: Weiss Lake with a 426 mile shore line constitutes one of the greatest recreational areas in the Southeast which will benefit thousands of people in this area:

Therefore be it resolved that every effort be made to pressure the ore mining interests along the Etowah River to accept their responsibility in correcting this problem for the benefit of all people concerned.

Cherokee County Industrial Committee

/S/ James H. Jones
James H. Jones, Chairman

C-O-P-Y

CHEROKEE COUNTY BOARD OF REVENUE
CENTRE, ALABAMA

HUGH WEBB
PRESIDENT
LOIS SISK
CLERK

MEMBERS
ROBERT GARNER, DIST. 1
R. H. YOUNG, DIST. 2
RUSSELL EARLY, DIST. 3
BOB BELL, DIST. 4

RESOLUTION

It is hereby resolved by the Cherokee County Board of Revenue at its regular meeting held on Monday, September 11, 1961, thats its body join officially with other governmental and civic bodies in Cherokee County, Alabama and Floyd County, Georgia, in the move to correct the operations of the ore mining interests in Bartow County, Georgia, that are putting serious mud pollution in the Etowah River which finds its way into the parent Coosa River at Rome, Georgia and on into Weiss Lake in Floyd County, Georgia and Cherokee County, Alabama. Said mud pollution is causing serious damage to fish and wild life in these bodies of water and doing untold harm to the recreational development of this area affecting the welfare of thousands of people.

It is further resolved that the Rome Kraft Company be commended for correcting their pollution problem caused by the dumping of raw pulpwood waste into the Coosa River and the City of Rome likewise be commended for starting the building of sewerage disposal plants which will eliminate the flow of this waste into the Coosa River.

It is resolved finally that the Cherokee County, Alabama, Board of Revenue shall lend all its powers to the elimination of this Bartow County, Georgia, mining operation pollution through joint contacts with like minded bodies in the Federal, State of Georgia and State of Alabama domains.

CHEROKEE COUNTY BOARD OF REVENUE

/S/ Hugh Webb
Chairman

/S/ Robert Garner
Commissioner

/S/ R. H. Young
Commissioner

/S/ J. Russell Early
Commissioner

/S/ N. J. Fitzpatrick
Commissioner

Attest:
/S/ J. H. Shamblin
Clerk

REGULAR MEETING EVERY 2ND. & 4TH MONDAY

C-O-P-Y

BE IT REMEMBERED that at a regular meeting of the City Council of the City of Centre, Alabama, it was brought to the attention of the Council that with the advent of the Weiss Dam Reservoir located in Cherokee County, Alabama, and Floyd County, Georgia, a wonderful recreational area had been opened up to the general public; in addition potentially large industrial development sites have been created in this general area, all as a direct result of Alabama Power Company's program to develop Coosa River. However, the deposit of waste, garbage refuse, and the like in Coosa River and its tributaries has created a serious handicap to the future development and use of Weiss Lake Reservoir.

It has been brought to the attention of the City Council that Rome Kraft Company at Rome, Georgia, has recently expended large sums of money to minimize the harmful effects of industrial waste from its operations on the Coosa River, and that the City of Rome, Georgia, is now working to eliminate further pollution of Coosa River and its tributaries, and the efforts of Rome Kraft Company and the City of Rome, Georgia, are commended. However, certain mining operations along the tributaries of Coosa River in the State of Georgia, continue to deposit large quantities of mud and other debries therein which tends to render the waters of Weiss Lake Reservoir unattractive and undesirable for the people of the entire area.

NOW THEREFORE BE IT RESOLVED by the City Council of the City of Centre, Alabama, that it does hereby extend it's expression of appreciation to Rome Kraft Company and to the City of Rome, Georgia, for their interest and activity in helping to clear up the Weiss Lake Reservoir, and that all interested persons are hereby implored to so conduct industrial operations along the Coosa River and its tributaries, so as to minimize the deposit of any harmful or unsightly materials therein which greatly detract from the beauty and utility of the waters of Weiss Lake Reservoir.

BE IT FURTHER RESOLVED that a copy of this resolution be mailed to the City of Rome, Georgia, to Rome Kraft Company, and a copy thereof be released to the press in the affected areas.

/S/ W H Powell, Mayor

C-O-P-Y

September 6, 1961

The following resolution passed unanimously at a meeting of the Town Council of Town of Cedar Bluff, Cedar Bluff, Alabama, upon motion by H. E. Arnold, Jr., and seconded by Quinn Money:

Be it resolved that the deplorable muddy condition of the Etowah River, which runs into the Coosa, that has existed for many years has now become detrimental to the citizens of Cedar Bluff in developing the area.

Be it further resolved that the muddy condition of the water in the Coosa lowers the value of the lots on the lake.

Be it further resolved that the contaminated water of the Coosa is a hindrance in the filtering of water for the consumption of the citizens of the Town of Cedar Bluff.

Be it further resolved that appropriate action be taken to try to get this problem corrected. It is understood that this muddy condition is caused by mining interests in Bartow County, Georgia.

Be it further resolved that the town be authorized to furnish certified copies of this resolution to the Georgia Department of Health, Atlanta, Georgia.

/S/ G. L. Johnson
G. L. Johnson, Mayor

/S/ H E Arnold, Jr.
H. E. Arnold, Jr., Councilman

/S/ Charles Clayton
Charles Clayton,
Councilman

/S/ Quinn Money
Quinn Money, Councilman

/S/ Blake Money
Blake Money, Councilman

/S/ John Chesnut
John Chesnut, Councilman

c-o-p-y

RESOLUTION

The Town Council of Leesburg, Alabama, in its meeting of September 27, 1961, herewith resolves that the mud pollution in Weiss Lake at Leesburg is a menance to the industrial development of its community; that said mud pollution is caused principally by the indiscriminate washing of ore waste into the Etowah River by Bartow County, Georgia, mining interests, said waste going on into the parent Coosa River and into Weiss Lake.

It is further resolved that the Town of Leesburg, Alabama, shall lend the full weight of its moral and financial support to the effort now on foot through Federal and State agencies to correct said Bartow County, Georgia, ore washing operations.

Signed this 27 day of September, 1961 at Leesburg, Alabama.

/S/ B. C. Lokey
Mayor

/S/ Hoyt Mackey
Councilman

/S/ Newman Mackey
Councilman

/S/ Erby L. Chambers
Councilman

/S/ Jack Tillery
Councilman

/S/ Joe Carver
Councilman

Table C-1

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-1	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River at Georgia-Alabama State Line	8-6-62	9:40	1870	31	6.0	80.0	0.4	7.3	32		68	
	8-7-62	9:40	3930	29	5.5	70.8	0.7	7.6	30		68	
	8-8-62	10:35	4290	28	1.9	24.0	0.9	7.1	31		63	
	8-9-62	9:25	4710	29	3.4	43.8	1.2	7.3	36		77	
	8-10-62	9:35	2600	27	4.8	59.5	0.7	7.1	46		57	
	8-13-62	1:30	1980	30	10.2	133.7	4.2	7.9	26		65	
	8-14-62	10:40	4230	27	4.6	57.0	3.1	7.2	48		58	
	8-15-62	10:25	4200	28	3.8	48.0	2.7	7.0	31		53	
	8-16-62	10:35	4170	27	4.2	52.0	2.4	7.4	32		55	
	8-17-62	10:05	4130	26	4.8	58.4	2.4	7.4	43		43	
	8-20-62	8:50	1590	28	6.4	80.8	2.7	7.2	28		48	
	8-21-62	8:35	3210	29	5.2	66.9	1.1	7.4	27		38	
	8-22-62	8:35	3320	27	3.4	42.1	0.9	7.2	32		38	
	8-23-62	9:20	3600	28	3.5	44.2	1.7	7.2	28		47	
	8-24-62	10:45	3320	28	3.5	44.2	1.8	7.2	33		48	
	8-27-62	10:00	1440	28	5.9	74.5	2.1	7.3	26		45	
	8-28-62	9:42	2980	28	5.0	63.1	1.2	7.4	30		40	
	8-29-62	10:00	2970	28	4.2	53.0	1.3	7.2	25		40	
	8-30-62	10:05	2830	28	3.0	37.8	2.7	7.3	26		44	
	8-31-62	9:55	2910	28	3.1	39.1	1.6	7.3	26		54	

Table C-1 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-1	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River at Ga.-Ala. State Line	9-4-62	11:50	1270	32	9.9	133.9	4.4	8.2	30		50	
	9-5-62											
	9-6-62	11:45	2200	30	6.0	78.6	3.2	7.1	26		42	
	9-7-62	11:55	2220	28	4.0	50.5	1.5	7.1	26		39	
	9-10-62	11:15	1600	29	2.0	25.7	1.5	7.1	17		54	
	9-11-62	12:40	2360	31	4.0	53.4	1.9	7.2	24		57	
	9-12-62	11:10	2330	31	6.7	89.4	2.4	7.5	24		48	
	9-13-62	11:45	2270	29	4.0	51.5	1.5	7.1	20		41	
	9-14-62	10:15	2290	28	3.3	41.7	1.9	7.1	24		42	
	9-17-62	2:20	1860	29	3.8	48.9	0.6	7.1	14		47	
	9-18-62	10:00	3270	27	2.6	32.2	1.1	6.5	26		14	
	9-19-62	11:15	2970	28	2.8	35.4	0.7	7.1	37		45	
	9-20-62	11:40	2570	26	3.1	37.7	1.7	7.2	33		49	
	9-21-62	11:55	2320	25	4.0	47.7	0.8	6.8	35		37	
	9-24-62	11:15	1260	24	3.5	41.0	1.1	6.9	28		42	
	9-25-62											
	9-26-62	11:00	1880	24	3.5	41.0	1.2	7.2	28		46	
	9-27-62	10:25	1870	24	3.0	35.2	1.1	7.1	25		46	
Average			2745	28	4.4	56.0	1.7	7.2	29		49	
Maximum			4710	32	10.2	133.9	4.4	8.2	48		77	
Minimum			1260	24	1.9	24.0	0.4	6.5	14		14	

Table C-2

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-2	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 1.5 miles from Ga.-Ala. State Line	8-6-62	9:35	1870	29	5.7	63.4	2.0	7.2	29		65	
	8-7-62	9:55	3930	30	5.8	76.0	0.9	7.4	29		62	
	8-8-62	10:25	4290	28	2.5	31.6	0.4	7.0	34		63	
	8-9-62	9:20	4710	29	3.4	43.8	1.5	7.1	35		74	
	8-10-62	9:22	2600	29	3.8	48.9	1.0	7.1	38		62	
	8-13-62	1:25	1980	30	6.0	78.6	3.7	7.5	26		58	
	8-14-62	10:30	4230	28	5.7	72.0	3.1	7.2	37		53	
	8-15-62	10:15	4200	27	1.9	23.5	2.7	6.9	35		47	
	8-16-62	10:30	4170	30	3.3	43.2	2.8	7.4	30		55	
	8-17-62	10:00	4130	27	3.7	45.8	2.3	7.1	39		42	
	8-20-62	8:45	1590	28	4.8	60.6	1.7	7.3	24		41	
	8-21-62	8:30	3210	29	5.5	70.8	1.4	7.4	26		38	
	8-22-62	8:30	3320	27	3.8	47.1	1.0	7.2	38		38	
	8-23-62	9:15	3600	28	3.4	42.9	1.3	7.2	27		43	
	8-24-62	10:39	3320	28	4.4	55.6	1.2	7.3	33		52	
	8-27-62	9:50	1440	28	5.5	69.4	2.7	7.3	29		45	
	8-28-62	9:37	2980	28	5.9	74.5	1.8	7.3	25		41	
	8-29-62	9:55	2970	28	4.9	61.9	1.5	7.3	24		42	
	8-30-62	10:05	2830	28	2.8	35.4	1.4	7.3	25		45	
	8-31-62	9:50	2910	28	2.4	30.3	1.4	7.1	21		51	

Table C-2 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-2	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 1.5 miles from Ga.-Ala. State Line	9-4-62	11:40	1270	32	8.7	117.8	3.8	7.9	25		44	
	9-6-62	11:35	2200	29	6.4	82.3	2.6	7.3	25		43	
	9-7-62	11:45	2220	28	3.9	49.2	1.7	7.2	23		46	
	9-10-62	11:05	1600	30	1.8	23.6	1.4	7.1	18		58	
	9-11-62	12:35	2360	30	3.5	45.8	2.4	7.2	21		59	
	9-12-62	11:00	2330	31	6.0	80.0	1.8	7.4	24		47	
	9-13-62	11:40	2270	29	4.5	57.9	1.5	7.3	18		44	
	9-14-62	10:05	2290	27	3.4	42.1	1.4	7.2	21		43	
	9-17-62	2:15	1860	29	2.5	32.2	1.4	7.2	15		49	
	9-18-62	9:55	3270	27	2.4	29.8	1.0	7.1	23		47	
	9-19-62	11:10	2970	28	3.0	37.8	1.7	7.2	29		47	
	9-20-62	11:35	2570	27	3.0	37.2	1.0	7.2	31		49	
	9-21-62	11:50	2320	26	2.9	35.3	0.9	7.1	33		51	
	9-24-62	11:10	1260	25	2.9	34.6	2.0	7.1	28		46	
	9-26-62	10:50	1880	24	4.0	46.9	1.0	7.2	26		47	
	9-27-62	10:15	1870	24	4.4	51.6	1.5	7.2	25		47	
Average	Av.		2745	28	4.1	52.2	1.7	7.2	27		50	
Maximum		Max.	4710	32	8.7	117.8	3.8	7.9	38		74	
Minimum	Min.		1260	24	1.8	23.5	0.4	6.9	15		38	

Table C-3

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-3	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 3.5 miles from Ga.-Ala. State Line	8-6-62	9:30	1870	30	5.2	68.2	2.3	7.3	25		63	
	8-7-62	9:25	3930	30	4.9	64.2	0.9	7.3	26		61	
	8-8-62	10:15	4290	28	2.7	34.0	0.9	7.1	34		62	
	8-9-62	9:10	4710	28	4.0	50.5	0.8	7.1	38		68	
	8-10-62	9:10	2600	28	4.0	50.5	0.8	7.0	40		60	
	8-13-62	1:20	1980	30	8.9	116.6	4.9	7.3	32		56	
	8-14-62	10:25	4230	28	5.9	74.5	3.8	7.2	34		52	
	8-15-62	10:10	4200	27	3.7	45.8	2.6	7.0	47		42	
	8-16-62	10:23	4170	28	3.5	44.2	2.5	7.3	37		52	
	8-17-62	9:55	4130	27	4.2	52.0	2.4	7.1	40		39	
	8-20-62	8:40	1590	28	6.1	77.0	2.3	7.4	22		39	
	8-21-62	8:25	3210	29	6.2	79.7	1.6	7.5	25		39	
	8-22-62	8:25	3320	27	3.7	45.8	1.0	7.2	31		39	
	8-23-62	9:10	3600	28	3.1	39.1	1.4	7.1	27		41	
	8-24-62	10:32	3320	28	3.5	44.2	0.9	7.2	34		48	
	8-27-62	9:45	1440	28	5.6	70.7	2.2	7.4	29		46	
	8-28-62	9:32	2980	28	6.7	84.6	3.4	7.5	27		45	
	8-29-62	9:50	2970	28	5.0	63.1	1.4	7.3	25		41	
	8-30-62	10:00	2830	28	3.6	45.4	1.7	7.4	23		44	
	8-31-62	9:45	2910	28	2.6	32.8	1.3	7.1	19		46	

Table C-3 (Cont'd).

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-3	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 3.5 Miles from Ga.-Ala. State Line	9-4-62	11:35	1270	32	8.9	120.3	3.7	7.9	28		47	
	9-5-62											
	9-6-62	11:30	2200	29	6.3	81.0	3.6	7.4	27		41	
	9-7-62	11:40	2220	28	3.9	49.2	1.8	7.2	19		46	
	9-10-62	11:00	1600	29	2.3	29.6	1.7	7.2	18		63	
	9-11-62	12:30	2360	31	2.8	37.4	2.2	7.2	16		60	
	9-12-62	10:55	2330	30	3.5	45.8	1.3	7.2	23		48	
	9-13-62	11:30	2270	30	5.4	70.8	1.8	7.4	19		46	
	9-14-62	9:50	2290	27	4.2	52.0	1.6	7.3	19		45	
	9-17-62	2:10	1860	29	2.4	30.9	1.0	7.2	15		50	
	9-18-62	9:45	3270	27	2.3	28.5	1.0	7.2	21		53	
	9-19-62	11:05	2970	28	2.7	34.0	1.5	7.2	28		52	
	9-20-62	11:30	2570	27	3.1	38.4	1.4	7.2	28		49	
	9-21-62	11:45	2320	26	3.3	40.1	0.5	7.2	33		51	
	9-24-62	11:05	1260	24	3.5	41.0	0.9	7.2	28		46	
	9-25-62											
	9-26-62	10:45	1880	24	3.3	38.7	1.0	7.2	23		47	
	9-27-62	10:10	1870	24	4.1	48.0	1.1	7.2	24		48	
Average			2745	28	4.3	54.7	1.8	7.3	27		49	
Maximum			4710	32	8.9	120.3	4.9	7.9	47		68	
Minimum			1260	24	2.3	28.5	0.8	7.0	15		39	

Table C-4

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-4	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, Poole's Ferry, 5.0 Miles from Ga.-Ala. State Line	8-6-62	9:20	1870	30	6.3	82.6	0.6	7.3	24		63	
	8-7-62	9:20	3930	29	3.7	47.6	0.6	7.2	24		61	
	8-8-62	10:05	4290	28	3.0	37.8	0.1	7.1	34		63	
	8-9-62	9:05	4710	28	3.8	48.0	0.7	7.1	37		65	
	8-10-62	9:05	2600	28	4.7	59.3	0.7	7.2	37		69	
	8-13-62	1:10	1980	30	9.5	124.5	4.9	7.6	31		56	
	8-14-62	10:15	4230	27	5.7	70.6	3.1	7.1	35		52	
	8-15-62	9:55	4200	28	4.1	51.8	2.6	7.0	45		40	
	8-16-62	10:15	4170	28	4.9	61.9	2.8	7.3	35		47	
	8-17-62	9:45	4130	27	4.9	60.7	2.9	7.2	40		44	
	8-20-62	8:35	3950	28	5.0	63.1	2.5	7.3	26		40	
	8-21-62	8:20	3210	29	6.0	77.2	2.5	7.5	25		42	
	8-22-62	8:20	3320	27	4.1	50.8	1.3	7.2	26		39	
	8-23-62	9:05	3600	28	3.6	45.4	1.4	7.2	26		40	
	8-24-62	10:25	3320	28	3.2	40.4	0.7	7.2	34		48	
	8-27-62	9:36	1440	28	5.5	69.4	2.4	7.3	31		46	
	8-28-62	9:27	2980	29	8.8	113.2	3.9	7.8	26		45	
	8-29-62	9:45	2970	28	5.7	72.0	1.6	7.4	25		44	
	8-30-62	9:50	2830	28	3.8	48.0	1.7	7.4	23		44	
	8-31-62	9:30	2910	28	5.0	63.1	1.4	7.2	17		45	

Table C-4 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-4	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, Poole's Ferry 5.0 miles from Ga.-Ala. State Line	9-4-62	11:25	1270	31	8.9	118.7	4.0	7.9	27		49	
	9-5-62											
	9-6-62	11:20	2200	29	5.6	71.1	1.8	7.3	26		44	
	9-7-62	11:25	2220	28	4.6	58.1	1.6	7.3	17		46	
	9-10-62	10:50	1600	29	2.3	29.6	1.3	7.4	20		61	
	9-11-62	12:15	2360	30	4.2	55.0	1.7	7.3	20		63	
	9-12-62	10:50	2330	30	4.5	59.0	1.8	7.4	23		55	
	9-13-62	11:25	2270	30	5.3	69.5	1.8	7.4	18		48	
	9-14-62	9:40	2290	27	4.1	50.8	1.5	7.4	14		48	
	9-17-62	2:05	1860	28	2.7	34.0	1.6	7.1	14		53	
	9-18-62	9:40	3270	27	2.3	28.5	1.1	7.1	20		50	
	9-19-62	11:00	2970	28	2.6	32.8	1.4	7.3	26		55	
	9-20-62	11:20	2570	27	3.0	37.2	1.1	7.2	28		50	
	9-21-62	11:40	2320	26	3.1	37.7	0.8	7.3	35		50	
	9-24-62	11:00	1260	24	3.5	41.0	1.0	7.2	30		50	
	9-25-62											
	9-26-62	10:40	1880	24	3.9	45.7	0.8	7.2	23		47	
	9-27-62	10:05	1870	23	3.3	38.0	1.1	7.2	26		48	
Average			2745	28	4.6	58.2	1.7	7.3	27		50	
Maximum			4710	31	9.5	124.5	4.9	7.9	45		69	
Minimum			1260	23	2.3	29.6	0.1	7.0	14		39	

Table C-5

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-5	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 7.0 Miles from Ga.-Ala State Line	8-6-62	9:15	1870	29	6.9	88.8	1.5	7.3	23		62	
	8-7-62	9:10	3930	29	6.0	77.2	1.3	7.4	27		63	
	8-8-62	9:55	4290	29	4.0	51.5	0.1	7.1	28		63	
	8-9-62	8:55	4710	29	4.5	57.9	1.2	7.1	28		65	
	8-10-62	8:55	2600	28	4.8	60.6	1.1	7.2	40		75	
	8-13-62	1:05	1980	31	10.1	134.7	5.9	7.9	31		61	
	8-14-62	10:10	4230	27	5.9	73.1	3.4	7.1	32		53	
	8-15-62	9:45	4200	28	7.3	92.2	3.8	7.2	33		42	
	8-16-62	10:10	4170	28	3.8	48.0	3.1	7.4	27		43	
	8-17-62	9:40	4130	28	3.5	44.2	2.8	7.3	38		45	
	8-20-62	8:30	1590	29	7.1	91.4	2.3	7.5	24		44	
	8-21-62	8:15	3210	29	7.0	90.1	2.0	7.6	20		42	
	8-22-62	8:15	3320	27	5.0	62.0	1.7	7.2	26		39	
	8-23-62	9:00	3600	28	4.7	59.3	1.7	7.3	28		40	
	8-24-62	10:20	3320	28	3.7	46.6	0.8	7.2	28		42	
	8-27-62	9:33	1440	28	6.3	79.5	2.6	7.3	33		47	
	8-28-62	9:22	2980	28	7.2	90.9	3.3	7.5	27		46	
	8-29-62	9:40	2970	28	7.5	94.7	2.7	7.6	26		45	
	8-30-62	9:45	2830	28	5.9	74.5	2.4	7.8	24		44	
	8-31-62	9:25	2910	28	4.7	59.3	2.2	7.3	26		45	

Table C-5 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-5	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 7.0 miles from Ga.-Ala. State Line	9-4-62	11:15	1270	30	8.9	116.6	3.5	7.9	21		49	
	9-5-62											
	9-6-62	11:15	2200	29	4.7	60.5	2.0	7.3	26		45	
	9-7-62	11:15	2220	27	4.6	57.0	1.4	7.3	23		45	
	9-10-62	10:45	1600	29	3.2	41.2	1.9	7.5	21		60	
	9-11-62	12:10	2360	30	5.8	76.0	2.4	7.4	21		63	
	9-12-62	10:45	2330	30	2.8	36.7	1.8	7.3	19		58	
	9-13-62	11:20	2270	30	5.4	70.8	1.8	7.4	23		52	
	9-14-62	9:35	2290	27	5.4	66.9	2.2	7.4	18		49	
	9-17-62	1:55	1860	28	2.8	35.4	1.6	7.3	19		51	
	9-18-62	9:35	3270	27	2.3	28.5	0.3	7.1	23		51	
	9-19-62	10:50	2970	27	2.9	36.0	1.9	7.3	29		54	
	9-20-62	11:15	2570	26	3.1	37.7	1.7	7.2	27		50	
	9-21-62	11:35	2320	25	3.6	43.0	0.5	7.1	32		47	
	9-24-62	10:55	1260	24	3.7	43.4	0.6	7.0	30		48	
	9-25-62											
	9-26-62	10:35	1880	24	3.8	44.5	1.3	7.2	26		45	
	9-27-62	10:00	1870	23	3.3	38.0	1.4	7.3	27		49	
Average			2745	28	5.1	64.1	2.0	7.3	27		51	
Maximum			4710	31	10.1	134.7	5.9	7.9	40		75	
Minimum			1260	23	2.3	28.5	0.1	7.0	18		39	

Table C-6

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-6	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, Sewell's Ferry, 11.0 Miles From Ga.-Ala. State Line	8-6-62	9:00	1890	30	6.9	90.4	1.3	7.4	23		59	
	8-7-62	9:00	3980	30	6.1	79.9	1.6	7.4	25		63	
	8-8-62	9:40	4340	28	2.8	35.4	0.0	7.2	25		63	
	8-9-62	8:45	4770	29	4.8	61.7	1.3	7.2	23		64	
	8-10-62	8:45	2630	28	3.5	44.2	0.7	7.1	27		74	
	8-13-62	8:40	2000	29	8.4	108.0	4.1	7.3	29		62	
	8-14-62	10:00	4290	28	8.1	102.2	4.5	7.3	25		54	
	8-15-62	9:35	4250	29	7.1	91.4	3.4	7.3	25		43	
	8-16-62	10:00	4220	29	7.5	96.5	4.5	7.7	27		41	
	8-17-62	9:35	4180	28	5.9	74.5	3.7	7.4	25		46	
	8-20-62	8:20	1610	29	6.3	81.0	2.2	7.5	22		45	
	8-21-62	8:05	3250	29	6.7	86.2	2.2	7.6	23		44	
	8-22-62	8:05	3370	27	5.0	62.0	1.6	7.3	23		40	
	8-23-62	8:50	3640	28	5.7	72.0	1.7	7.4	25		43	
	8-24-62	10:05	3360	28	4.5	57.8	0.2	7.2	26		39	
	8-27-62	9:25	1460	28	6.2	78.3	1.7	7.4	26		47	
	8-28-62	9:15	3020	28	7.2	90.9	2.1	7.6	24		48	
	8-29-62	9:30	3000	28	4.9	61.9	1.8	7.6	26		46	
	8-30-62	9:32	2870	28	5.7	72.0	2.0	7.6	20		45	
	8-31-62	9:15	2940	28	6.0	75.8	1.8	7.5	24		46	

Table C-6 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-6	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, Sewell's Ferry, 11.0 Miles From Ga.-Ala. State Line	9-4-62	11:00	1290	31	7.8	104.0	3.1	7.7	25		50	
	9-5-62											
	9-6-62	11:05	2230	28	1.2	15.1	1.1	7.1	26		48	
	9-7-62	11:00	2240	27	4.5	55.7	1.5	7.3	26		49	
	9-10-62	11:45	1620	31	5.7	76.0	2.2	7.5	23		55	
	9-11-62	12:00	2390	30	1.7	22.3	2.7	7.6	17		60	
	9-12-62	10:30	2360	30	1.6	21.0	1.6	7.3	17		58	
	9-13-62	11:10	2290	29	5.0	64.3	1.7	7.5	21		55	
	9-14-62	9:30	2320	26	4.3	52.3	2.1	7.4	19		52	
	9-17-62	1:45	1880	27	3.6	44.6	1.5	7.3	24		51	
	9-18-62	9:25	3310	26	2.4	29.2	0.8	7.2	22		52	
	9-19-62	10:40	3000	27	2.5	31.0	2.0	7.3	24		54	
	9-20-62	11:05	2600	26	2.9	35.3	1.1	7.3	24		52	
	9-21-62	11:25	2350	25	4.0	47.7	0.7	7.2	31		48	
	9-24-62	10:40	1280	24	5.4	63.3	1.1	7.4	26		53	
	9-25-62											
	9-26-62	10:25	1900	23	4.4	50.5	1.0	7.3	22		49	
	9-27-62	9:50	1890	23	4.0	46.1	1.0	7.3	24		49	
Average			2778	28	5.0	63.3	1.9	7.4	24		51	
Maximum			4770	31	8.4	108.0	4.5	7.7	31		74	
Minimum			1280	23	1.2	15.1	0.2	7.1	17		39	

Table C-7

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-7	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 14.0 Miles from Ga.-Ala State Line	8-6-62	8:45	1890	29	6.5	83.6	1.7	7.3	23		58	
	8-7-62	8:30	3980	29	5.3	68.2	0.7	7.3	24		60	
	8-8-62	9:15	4340	29	4.8	61.7	0.5	7.2	25		58	
	8-9-62	8:25	4770	29	7.3	93.9	1.4	7.4	23		61	
	8-10-62	8:25	2630	28	6.5	82.1	1.6	7.3	25		66	
	8-13-62	8:20	2000	28	6.5	82.1	3.2	7.3	22		62	
	8-14-62	9:45	4290	28	6.1	77.0	3.0	7.2	24		60	
	8-15-62	9:25	4250	27	4.7	58.2	2.5	7.1	24		43	
	8-16-62	9:45	4220	28	5.2	65.6	2.7	7.4	26		41	
	8-17-62	9:25	4180	28	3.3	41.7	2.6	7.1	27		42	
	8-20-62	8:10	1610	28	5.1	64.4	1.4	7.3	14		45	
	8-21-62	7:55	3250	28	5.0	63.1	2.0	7.3	15		45	
	8-22-62	7:55	3370	27	4.8	59.5	1.6	7.3	20		43	
	8-23-62	8:43	3640	28	5.7	72.0	1.9	7.4	21		46	
	8-24-62	9:55	3360	28	5.9	74.5	1.8	7.4	25		38	
	8-27-62	9:15	1460	28	7.0	88.4	2.1	7.6	20		44	
	8-28-62	9:05	3020	29	8.1	104.2	2.5	8.2	14		46	
	8-29-62	9:20	3000	28	7.7	97.3	2.0	7.7	14		47	
	8-30-62	9:20	2870	29	7.1	91.4	2.2	7.7	13		46	
	8-31-62	9:00	2940	29	7.1	91.4	2.4	7.7	15		48	

Table C-7 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-7	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 14.0 miles from Ga.-Ala State Line	9-4-62	10:45	1290	31	8.8	118.7	3.3	7.8	18		47	
	9-5-62											
	9-6-62	10:50	2230	28	6.7	84.6	2.7	7.5	27		48	
	9-7-62	10:40	2240	27	5.3	65.7	1.7	7.4	19		49	
	9-10-62	10:15	1620	28	6.3	79.5	1.4	7.6	24		46	
	9-11-62	11:50	2390	30	8.9	116.6	3.4	7.9	12		52	
	9-12-62	10:15	2360	29	10.3	132.5	0.5	8.6	12		49	3
	9-13-62	10:55	2290	29	7.5	96.5	2.2	7.8	13		50	
	9-14-62	9:20	2320	27	7.3	90.4	2.0	8.3	14		53	2
	9-17-62	1:35	1880	27	5.0	62.0	1.3	7.4	18		48	
	9-18-62	9:15	3310	26	5.7	69.3	1.4	7.5	21		51	
	9-19-62	10:30	3000	27	6.3	78.0	1.1	7.5	21		53	
	9-20-62	10:50	2600	26	5.7	69.3	1.6	7.4	23		50	
	9-21-62	11:10	2350	24	6.8	79.7	1.6	7.4	31		50	
	9-24-62	10:30	1280	24	8.0	93.8	1.6	7.7	27		51	
	9-25-62											
	9-26-62	10:15	1900	24	8.0	93.8	1.1	7.6	22		50	
	9-27-62	9:40	1890	23	6.9	79.3	1.4	7.5	23		50	
Average			2778	28	6.5	81.4	1.9	7.5	21		50	
Maximum			4770	31	10.3	132.5	3.4	8.6	31		66	3
Minimum			1280	23	3.3	41.7	0.5	7.1	12		38	2

Table C-8

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-8	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, Bridge, Ala. Highway No.9 at Cedar Bluff, 19.0 Miles from Ga.-Ala. State Line	8-6-62	10:35	1930	31	7.4	98.7	0.9	7.6	22		57	
	8-7-62	1:30	4060	30	6.2	81.2	0.4	7.5	20		58	
	8-8-62	11:25	4430	29	6.4	82.3	0.9	7.3	25		57	
	8-9-62	10:15	4860	29	6.4	82.3	1.5	7.2	22		56	
	8-10-62	11:00	2680	28	6.2	78.3	--	7.2	27		66	
	8-13-62	9:10	2040	29	8.8	113.2	3.7	7.6	22		60	
	8-14-62	9:35	4370	29	8.0	103.0	3.6	7.5	22		61	
	8-15-62	9:10	4340	29	8.5	109.3	2.5	7.6	20		47	
	8-16-62	9:30	4310	29	9.4	120.9	4.0	7.9	20		46	
	8-17-62	9:15	4260	29	9.0	115.7	3.8	7.7	21		45	
	8-20-62	8:00	1640	28	5.5	69.4	1.5	7.7	15		51	
	8-21-62	7:45	3320	30	7.5	98.3	1.2	7.9	12		46	
	8-22-62	9:00	3430	28	5.0	63.1	1.1	7.3	17		44	
	8-23-62	8:35	3720	28	7.1	89.6	2.0	7.7	15		47	
	8-24-62	9:40	3420	28	6.2	78.3	2.4	7.5	27		39	
	8-27-62	9:05	1490	28	5.7	72.0	1.4	7.4	25		43	
	8-28-62	8:55	3070	27	5.9	73.1	1.4	7.5	16		45	
	8-29-62	9:10	3060	28	7.7	97.3	1.8	7.9	14		44	
	8-30-62	9:05	2920	28	6.5	82.1	1.9	7.8	14		43	
	8-31-62	8:45	3000	29	7.6	97.8	2.1	7.9	14		48	

Table C-8 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-8	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, Bridge, Ala. Highway No.9 at Cedar Bluff, 19.0 Miles from Ga.-Ala. State Line	9-4-62	10:35	1320	29	7.8	100.2	2.0	7.9	16		47	
	9-5-62											
	9-6-62	10:40	2270	28	4.4	55.6	1.3	7.3	22		49	
	9-7-62	10:20	2290	27	2.7	33.5	1.2	7.3	18		51	
	9-10-62	10:05	1650	28	8.1	102.2	2.6	7.9	18		50	
	9-11-62	11:35	2440	29	9.4	120.9	2.7	8.4	11		54	2
	9-12-62	10:00	2400	28	4.8	60.6	1.9	7.5	13		50	
	9-13-62	10:30	2340	28	8.5	107.2	3.1	8.0	14		51	
	9-14-62	9:10	2360	27	6.8	84.3	2.0	7.8	12		49	
	9-17-62	1:25	1920	28	7.7	97.3	1.3	7.7	13		49	
	9-18-62	9:00	3370	26	4.3	52.3	1.1	7.4	21		49	
	9-19-62	10:20	3060	27	5.3	65.7	1.8	7.4	23		52	
	9-20-62	10:35	2650	25	5.8	69.0	1.5	7.5	24		51	
	9-21-62	10:45	2390	24	6.5	76.2	2.2	7.6	28		51	
	9-24-62	10:20	1300	23	6.7	77.0	1.7	7.7	22		51	
	9-25-62											
	9-26-62	10:05	1940	23	7.1	81.6	1.3	7.5	23		48	
	9-27-62	9:30	1930	22	7.0	79.2	1.0	7.6	21		50	
Average			2833	28	6.6	85.2	1.9	7.6	19		50	
Maximum			4860	31	9.4	120.9	4.0	8.4	28		66	2
Minimum			1300	22	2.7	33.5	0.4	7.2	11		39	0

Table C-9

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-9	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River 22.0 Miles from Ga.-Ala. State Line	8-6-62	10:45		31	7.6	101.2	1.0	7.7	10		58	
	8-7-62	1:40		30	6.6	86.5	0.6	7.6	15		58	
	8-8-62	11:35		29	5.7	73.4	0.7	7.3	23		62	
	8-9-62	11:45		29	5.1	65.6	1.2	7.2	23		57	
	8-13-62	2:15		31	9.8	130.7	4.0	8.0	15		62	
	8-14-62	8:25		28	7.3	92.2	3.0	7.4	14		67	
	8-15-62	8:10		29	8.4	108.0	3.7	7.5	14		47	
	8-16-62	8:40		28	7.5	94.7	3.5	7.5	13		48	
	8-17-62	8:35		28	8.4	106.0	3.6	7.7	13		47	
	8-20-62	9:25		29	8.0	103.0	1.5	7.1	13		51	
	8-21-62	9:05		29	7.3	93.9	2.0	7.9	10		50	
	8-22-62	9:08		28	6.5	82.1	1.6	7.6	15		46	
	8-23-62	9:50		29	6.0	77.2	1.4	7.5	13		47	
	8-24-62	8:30		28	4.7	59.3	1.1	7.4	22		49	
	8-27-62	8:25		28	6.0	75.8	1.7	7.5	19		48	
	8-28-62	8:15		28	5.2	65.6	2.1	7.8	12		51	
	8-29-62	8:30		28	7.8	98.5	1.8	7.8	18		51	
	8-30-62	8:10		28	7.0	88.4	1.9	7.4	13		53	
	8-31-62	7:35		28	6.4	80.8	2.1	7.4	16		48	

Table C-9 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-9	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River, 22.0 Miles from Ga.-Ala State Line	9-4-62	9:40		30	8.0	104.8	2.5	8.0	10		51	
	9-5-62	8:30		29	7.0	90.1	2.3	7.5	9		47	
	9-6-62	9:55		28	7.1	89.6	3.0	7.5	10		49	
	9-7-62	9:05		25	5.1	60.7	1.3	7.4	13		53	
	9-10-62	9:10		26	5.7	69.3	1.2	7.4	10		57	
	9-11-62	10:45		28	8.2	103.4	2.1	7.9	9		55	
	9-12-62	9:00		27	8.2	101.6	2.7	7.8	9		52	
	9-13-62	2:30		30	9.7	129.1	2.8	8.0	10		52	
	9-14-62	8:20		26	6.7	81.5	1.7	7.6	12		47	
	9-17-62	11:55		27	5.8	71.9	1.6	7.5	13		49	
	9-18-62	8:20		26	6.5	79.0	1.4	7.3	18		48	
	9-19-62	8:50		26	6.6	80.3	1.7	7.5	18		53	
	9-20-62	9:45		26	6.7	81.5	1.8	7.6	18		51	
	9-21-62	9:15		24	6.6	77.4	2.4	7.3	26		51	
	9-24-62	9:15		23	7.0	80.5	1.0	7.2	15		52	
	9-25-62											
	9-26-62	9:10		23	6.7	77.0	1.5	7.5	16		62	
	9-27-62	8:35		22	6.9	78.1	1.4	7.5	16		58	
Average				28	6.9	87.2	2.0	7.6	15		52	
Maximum				31	9.8	130.7	4.0	8.0	26		67	
Minimum				22	4.7	59.3	0.6	7.1	9		46	

Table C-10

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-10	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River 25.0 Miles from Ga.-Ala. State Line	8-13-62	2:30		30	9.7	129.1	3.9	8.1	14		62	
	8-14-62	8:35		29	8.8	113.2	3.2	7.7	10		66	
	8-15-62	8:25		29	8.5	109.3	3.4	7.6	10		47	
	8-16-62	8:50		28	8.2	103.4	3.5	7.8	12		46	
	8-17-62	8:45		28	8.4	106.0	3.3	7.7	14		43	
	8-20-62	9:30		29	7.7	99.0	2.1	7.7	10		48	
	8-21-62	9:20		29	8.2	105.4	1.8	8.3	9		52	2
	8-22-62	9:15		28	6.2	78.3	1.1	7.6	14		47	
	8-23-62	10:00		29	7.0	90.1	1.4	7.8	12		48	
	8-24-62	8:43		28	5.6	70.7	1.4	7.5	26		47	
	8-27-62	8:32		28	6.9	87.1	2.2	7.8	14		49	
	8-28-62	8:20		28	6.5	82.1	1.2	8.0	11		50	
	8-29-62	8:37		28	7.6	96.0	2.1	8.0	9		52	
	8-30-62	8:20		28	7.3	92.2	2.3	7.9	12		52	
	8-31-62	7:45		28	6.7	84.6	1.8	7.8	12		50	

Table C-10 (Cont'd.)

Coosa River (Weiss Lake) Study

August - September 1962

Sampling Point No. C-10	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Coosa River 25.0 Miles from Ga.-Ala. State Line	9-4-62	9:50		30	7.9	103.5	2.2	8.2	9		54	
	9-5-62	8:40		29	6.9	88.8	2.4	7.7	10		49	
	9-6-62	10:00		28	6.0	75.8	2.0	7.6	9		50	
	9-7-62	9:20		27	5.6	69.4	1.5	7.5	13		52	
	9-10-62	9:20		27	6.7	83.0	2.6	7.5	10		52	
	9-11-62	10:55		29	9.2	118.3	1.6	8.1	9		51	
	9-12-62	9:20		28	8.8	111.1	2.3	8.3	8		53	2
	9-13-62	2:40		30	9.7	129.1	1.2	8.4	9		55	3
	9-14-62	8:30		27	7.7	95.4	1.7	7.9	10		53	
	9-17-62	11:25		28	6.3	79.5	1.5	7.6	12		50	
	9-18-62	8:30		26	6.4	77.8	1.5	7.6	16		52	
	9-19-62	9:00		26	6.3	76.6	0.4	8.6	18		57	6
	9-20-62	9:55		26	6.2	75.4	1.3	7.6	16		50	
	9-21-62	9:35		25	6.4	76.2	1.4	7.6	18		52	
	9-24-62	9:30		23	7.3	83.9	0.8	7.5	15		54	
	9-26-62	9:20		23	8.1	93.1	1.4	7.8	11		51	
	9-27-62	8:45		23	7.1	81.6	1.5	7.7	13		51	
Average				28	7.4	92.7	1.9	7.8	12		51	
Maximum				30	9.7	129.1	3.9	8.6	26		66	6
Minimum				23	5.6	69.4	0.4	7.5	8		43	2

Table C-11

Laboratory Results

Total Iron Values (Parts Per Million)

Weiss Lake - Coosa River Study

		Sampling Point					
Date	**Depth**	**C-1**	**C-2**	**C-3**	**C-4**	**C-6**	**C-8**
11-5-62	Top	0.15	0.11	0.10	0.25	0.15	0.29
	Mid	0.35	0.40	0.27	0.15	0.32	0.45
	Bottom	0.20	0.35	0.13	0.36	0.17	0.26
11-6-62	Top	0.32	0.30	0.15	0.12	0.45	0.49
	Mid	0.78	0.70	0.12	0.33	0.60	0.65
	Bottom	0.82	0.51	0.05	0.08	0.80	0.55
11-7-62	Top	1.10	1.12	0.60	0.37	0.43	0.48
	Mid	0.90	0.60	0.83	0.39	0.61	0.37
	Bottom	0.70	0.95	0.58	0.82	0.34	0.82
11-13-62	Top	1.48	1.90	1.66	1.66	1.20	1.16
	Mid	1.70	1.30	2.02	1.81	1.39	0.53
	Bottom	1.46	1.41	1.81	1.44	1.61	0.55
11-14-62	Top	1.49	1.67	1.53	1.10	1.12	0.55
	Mid	1.23	1.18	1.20	1.05	1.56	0.95
	Bottom	1.25	1.35	1.48	1.75	1.64	0.75
11-15-62	Top	0.94	1.24	1.06	1.12	1.02	0.82
	Mid	1.16	1.68	1.88	1.70	1.82	1.24
	Bottom	1.24	0.76	1.00	0.96	1.52	0.38
11-16-62	Top	1.96	0.80	0.96	0.70	0.54	0.78
	Mid	0.70	1.04	0.90	0.98	0.84	0.36
	Bottom	0.78	1.58	1.90	1.58	1.40	1.30
Average	Top	1.06	1.02	0.87	0.76	0.70	0.65
	Mid	1.06	0.99	1.03	0.92	1.02	0.65
	Bottom	0.92	0.99	0.99	1.00	1.07	0.66

Note: Samples were taken 3 feet below surface, mid-depth, and 2 feet from bottom.

Table CH-1

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-1	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, Bridge Near Chattoogaville, Ga., 2.5 Miles Above Ga.-Ala. State Line	8-6-62	12:00		26	3.1	37.7	2.4	9.0	12		220	21
	8-7-62	2:40		26	5.1	62.0	1.9	7.8	22		155	0
	8-8-62	1:00		25	5.3	63.1	1.2	7.9	21		161	0
	8-9-62	1:25		25	3.0	35.8	5.8	9.0	23		217	28
	8-10-62	1:35		25	3.8	45.3	1.7	9.1	23		222	40
	8-13-62	4:30		25	4.3	51.2	3.6	8.5	23		195	15
	8-14-62	12:20		25	7.7	91.7	4.5	7.8	24		124	0
	8-15-62	11:30		26	7.8	94.9	3.6	7.4	23		124	0
	8-16-62	12:55		26	2.7	32.8	--	8.8	14		160	22
	8-17-62	11:10		25	2.6	31.0	6.7	8.8	11		161	20
	8-20-62	10:50		26	2.8	34.0	2.5	9.2	13		173	25
	8-21-62	10:40		26	4.4	53.5	2.0	7.9	14		131	0
	8-22-62	10:50		24	5.1	59.8	1.7	8.0	24		128	0
	8-23-62	12:40		25	2.0	23.8	--	9.1	13		173	19
	8-24-62	12:35		24	6.6	77.4	4.6	9.0	13		163	22
	8-27-62	11:20		25	2.2	26.2	2.1	9.5	8		182	37
	8-28-62	11:45		25	4.8	57.2	1.8	8.1	13		129	0
	8-29-62	11:25		25	5.2	61.9	--	8.4	10		140	10
	8-30-62	9:55		24	3.1	36.3	3.6	8.9	17		171	22
	8-31-62	8:25		24	1.7	19.9	5.0	9.1	9		191	33

Table CH-1 (Cont'd.)

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-1	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, Bridge near Chattoogaville, Ga., 2.5 miles Above Ga.-Ala. State Line	9-4-62	1:40		24	4.5	52.8	2.8	8.3	13		132	2
	9-5-62	1:55		25	5.4	64.3	1.9	8.0	15		126	0
	9-6-62	1:55		24	5.7	66.9	2.3	7.8	21		121	0
	9-7-62	9:15		22	1.1	12.4	8.5	8.6	11		158	12
	9-10-62	1:30		24	3.2	37.5	2.9	9.1	21		168	30
	9-11-62	9:30		23	4.0	46.1	1.8	8.0	22		136	0
	9-12-62	1:25		25	5.1	60.7	2.8	7.9	18		124	0
	9-13-62	8:30		23	0.3	3.5	7.0	9.0	14		180	25
	9-14-62	12:15		23	2.9	33.4	3.5	8.8	130		131	11
	9-17-62	3:45		23	4.2	48.4	2.6	7.6	42		113	0
	9-18-62	11:00		22	5.0	56.6	1.7	7.8	42		113	0
	9-19-62	2:00		23	5.5	63.2	4.6	7.9	27		122	0
	9-20-62	1:25		23	3.5	40.3	0.6	8.8	18		163	15
	9-21-62	1:35		21	3.8	42.3	1.8	9.2	15		179	33
	9-24-62	1:45		21	3.0	33.4	3.5	9.3	13		185	40
	9-25-62	10:00		21	4.4	48.9	2.2	8.3	21		137	5
	9-26-62	12:05		20	5.6	61.1	0.8	7.9	21		120	0
	9-27-62	11:35		19	2.0	21.4	5.0	9.3	16		186	39
Average				24	4.0	47.1	3.2	8.5	21		156	14
Maximum				26	7.8	94.9	8.5	9.5	130		222	40
Minimum				19	0.3	3.5	0.6	7.4	8		113	2

Table CH-2

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-2	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, County Highway Bridge, 3.0 Miles Below Ga.-Ala. State Line	8-6-62	11:45	192	26	3.2	38.9	2.7	8.9	15		200	19
	8-7-62	2:25	192	26	4.7	57.2	1.1	7.9	24		160	0
	8-8-62	12:45	219	25	5.4	64.3	0.5	8.1	22		155	0
	8-9-62	1:10	213	25	4.2	50.0	2.4	8.5	22		193	14
	8-10-62	1:25	189	26	4.0	48.7	2.3	8.7	22		201	20
	8-13-62	4:50	178	24	4.1	48.0	2.8	8.8	22		214	23
	8-14-62	12:35	176	25	6.4	76.2	2.3	8.0	25		136	0
	8-15-62	11:45	168	25	8.2	97.6	3.8	7.5	25		124	0
	8-16-62	1:10	162	24	6.5	76.2	4.0	7.4	24		135	0
	8-17-62	11:25	162	24	4.2	49.2	5.4	8.8	16		144	15
	8-20-62	10:38	155	24	3.9	45.7	1.9	8.9	15		154	15
	8-21-62	10:30	200	25	4.0	47.7	1.3	8.6	18		147	10
	8-22-62	10:35	190	23	5.4	62.0	1.7	7.5	65		108	0
	8-23-62	12:25	170	24	5.3	62.1	1.4	8.1	21		134	0
	8-24-62	12:25	170	24	3.3	38.7	3.6	8.5	26		159	13
	8-27-62	11:35	160	25	3.1	37.0	2.2	9.1	16		167	25
	8-28-62	12:00	155	26	3.8	46.2	2.1	8.9	21		158	18
	8-29-62	11:45	150	25	5.4	64.3	1.3	8.3	21		124	4
	8-30-62	10:15	155	24	5.5	64.5	1.4	8.3	26		131	4
	8-31-62	8:40	150	23	3.9	45.0	1.9	8.8	18		160	16

Table CH-2 (Cont'd.)

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-2	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, County Highway Bridge, 3.0 Miles Below Ga.-Ala. State Line	9-4-62	2:05	148	25	3.3	39.4	2.9	8.9	17		161	16
	9-5-62	2:15	168	25	5.2	61.9	2.8	8.3	25		129	3
	9-6-62	2:10	192	24	6.0	70.4	2.1	7.9	26		127	0
	9-7-62	9:30	165	22	4.6	52.0	1.6	7.8	16		126	0
	9-10-62	1:50	150	25	3.0	35.8	2.4	9.0	13		166	19
	9-11-62	9:42	152	23	4.1	47.2	1.5	8.7	13		148	15
	9-12-62	2:05	176	25	5.2	61.9	1.9	7.8	23		126	0
	9-13-62	9:15	158	23	4.7	54.0	1.6	7.9	22		117	0
	9-14-62	12:35	221	23	3.6	41.5	3.2	8.6	45		151	8
	9-17-62	4:30	207	23	4.1	47.2	2.7	7.7	40		123	0
	9-18-62	11:20	184	22	4.9	55.5	1.7	7.9	39		115	0
	9-19-62	2:15	162	24	5.7	66.9	2.7	7.8	30		116	0
	9-20-62	1:40	150	23	5.3	60.9	2.3	8.1	26		139	0
	9-21-62	1:50	142	20	4.6	50.1	1.5	8.7	24		165	17
	9-24-62	2:00	135	21	3.8	42.3	3.5	8.9	18		176	30
	9-25-62	10:20	135	21	4.1	45.6	1.3	9.1	25		177	3
	9-26-62	12:20	140	19	5.7	61.3	0.6	7.9	22		131	0
	9-27-62	11:50	220	19	6.0	64.5	1.0	7.9	24		125	0
Average			171	24	4.7	54.7	2.2	8.3	24		148	8
Maximum			221	26	8.2	97.6	5.4	9.1	65		214	30
Minimum			135	19	3.0	35.8	0.5	7.4	13		108	0

Table CH-3

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-3	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, County Highway Bridge at Gaylesville, 8.5 miles Below Ga.-Ala. State Line	8-6-62	11:30	192	31	2.6	34.7	2.3	8.6	15		195	8
	8-7-62	2:15	192	26	3.0	36.5	1.8	8.7	22		200	13
	8-8-62	12:40	219	26	3.4	41.3	1.2	8.2	24		166	0
	8-9-62	1:00	213	25	6.0	71.5	1.2	8.6	24		168	12
	8-10-62	1:10	189	27	5.5	68.1	2.2	8.0	25		178	0
	8-13-62	5:00	178	26	5.2	63.2	3.0	8.5	23		200	16
	8-14-62	12:50	176	25	3.2	38.2	6.5	8.5	25		154	8
	8-15-62	11:55	168	25	3.5	41.7	3.7		26		155	16
	8-16-62	1:20	162	25	8.4	100.0	4.1	8.4	24		126	3
	8-17-62	11:30	162	25	6.9	82.1	2.5	8.0	85		119	0
	8-20-62	10:30	155	26	2.7	32.8	1.4	8.7	21		159	11
	8-21-62	10:20	200	31	2.8	37.4	1.6	8.7	17		157	10
	8-22-62	10:15	190	25	3.2	38.2	1.3	8.7	33		148	11
	8-23-62	12:15	170	25	3.9	46.5	1.4	7.7	22		105	0
	8-24-62	12:15	170	25	4.6	54.8	1.1	7.6	27		118	0
	8-27-62	11:45	160	25	2.7	32.2	1.1	8.6	28		158	11
	8-28-62	12:15	155	27	2.1	26.0	2.6	8.8	24		161	15
	8-29-62	11:55	150	26	3.4	41.3	2.0	8.9	22		164	20
	8-30-62	10:25	155	24	3.1	36.3	1.8	8.5	23		146	9
	8-31-62	9:00	150	24	4.9	57.5	1.3	8.0	21		128	0

Table CH-3 (Cont d.)

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-3	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, County Highway Bridge at Gaylesville 8.0 Miles Below Ga.-Ala. State Line	9-4-62	2:20	148	27	3.6	44.6	2.5	8.8	22		158	12
	9-5-62	2:25	168	25	1.7	20.3	4.5	8.6	25		160	10
	9-6-62	2:25	192	25	4.9	58.4	1.9	7.6	20		133	
	9-7-62	9:40	165	23	4.6	52.9	2.1	7.9	24		128	
	9-10-62	2:00	150	25	2.8	33.4	2.8	8.3	16		130	3
	9-11-62	9:55	152	24	1.2	14.1	2.3	8.4	12		164	9
	9-12-62	2:20	176	27	3.4	42.1	1.5	9.1	13		153	15
	9-13-62	9:35	158	24	2.9	34.0	1.9	8.0	24		139	
	9-14-62	12:45	221	23	4.4	50.5	2.1	8.1	34		123	
	9-17-62	4:40	207	24	2.8	32.8	2.5	8.4	29		150	5
	9-18-62	11:30	184	23	2.5	28.8	1.7	8.3	38		143	3
	9-19-62	2:30	162	24	4.5	52.8	1.0	7.9	37		115	
	9-20-62	1:55	150	24	5.7	66.9	3.0	8.0	27		115	
	9-21-62	2:05	142	21	5.4	60.0	1.4	7.8	29		120	
	9-24-62	2:15	135	20	3.0	32.7	2.2	8.9	27		167	18
	9-25-62	10:35	135	22	3.9	44.2	1.6	8.9	27		172	19
	9-26-62	12:30	140	20	3.4	37.8	1.7	8.9	24		165	16
	9-27-62	12:15	220	20	4.5	49.0	1.7	8.0	33		135	
Average			171	25	3.9	45.7	2.2	8.4	26		149	7
Maximum			221	31	8.4	100.0	6.5	9.1	85		200	20
Minimum			135	20	1.2	14.1	1.0	7.6	12		105	0

Table CH-4

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-4	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, Bridge Ala. Highway No. 68, North of Cedar Bluff 14.0 Miles Below Ga.-Ala. State Line	8-6-62	11:25		31	7.0	93.4	1.6	8.1	23		120	0
	8-7-62	2:10		30	5.7	74.7	1.2	8.0	22		121	0
	8-8-62	12:00		30	5.6	73.4	1.3	8.1	21		121	0
	8-9-62	12:50		31	9.5	126.7	3.4	8.5	23		145	7
	8-10-62	1:00		28	8.3	104.8	3.5	8.0	25		139	0
	8-13-62	5:10		--	8.0	--	4.4	7.9	21		132	0
	8-14-62	1:00		29	8.0	103.0	4.3	8.1	23		111	0
	8-15-62	12:05		29	9.1	117.0	5.6	7.2	22		110	0
	8-16-62	1:30		29	4.3	55.3	4.6	7.9	21		112	0
	8-17-62	11:40		30	9.4	123.2	4.6	8.2	18		97	0
	8-20-62	10:20		30	7.0	91.7	2.8	8.2	13		104	0
	8-21-62	10:10		31	6.3	84.0	2.6	8.0	15		108	0
	8-22-62	10:05		29	5.4	69.5	2.4	7.8	19		107	0
	8-23-62	11:40		30	7.3	95.7	2.8	8.3	18		117	3
	8-24-62	12:55		29	2.3	29.6	2.8	8.0	25		120	
	8-27-62	11:55		29	7.5	96.5	3.3	8.4	24		127	2
	8-28-62	12:25		29	7.4	95.2	3.4	8.3	25		127	2
	8-29-62	12:10		29	8.3	106.7	3.6	8.3	21		129	5
	8-30-62	10:35		29	7.4	95.2	2.8	8.3	25		123	3
	8-31-62	9:15		28	6.0	75.8	2.7	8.0	22		118	

Table CH-4 (Cont'd.)

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-4	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, Bridge Ala. Highway No. 68, North of Cedar Bluff 14.0 Miles Below Ga.-Ala. State Line	9-4-62	2:35		29	7.6	97.8	3.8	8.3	17		123	3
	9-5-62	2:45		30	8.0	104.8	3.4	8.1	18		116	
	9-6-62	2:40		29	6.2	79.7	3.7	7.8	23		122	
	9-7-62	9:55		26	5.7	69.3	2.5	8.0	21		132	
	9-10-62	2:15		27	8.6	106.5	0.3	8.4	12		152	4
	9-11-62	10:05		26	9.5	115.4	4.8	8.5	25		146	11
	9-12-62	2:35		30	10.5	137.5	1.0	8.7	14		142	12
	9-13-62	9:50		27	7.4	90.4	2.9	8.3	21		141	5
	9-14-62	1:10		26	5.7	69.3	2.7	8.1	30		140	
	9-17-62	4:55		27	7.8	96.6	2.8	8.3	27		126	3
	9-18-62	11:40		27	6.4	79.3	3.1	8.0	27		131	
	9-19-62	2:40		26	6.9	83.9	1.2	8.3	26		135	2
	9-20-62	2:05		25	7.5	89.3	4.8	8.3	27		135	2
	9-21-62	2:15		24	6.7	78.6	3.4	8.0	35		131	
	9-24-62	2:30		24	8.3	97.3	1.9	8.3	25		134	2
	9-25-62	10:45		24	6.9	80.9	1.7	8.2	18		132	
	9-26-62	12:40		22	7.7	87.2	2.8	8.3	31		136	3
	9-27-62	12:30		23	7.2	82.7	2.8	8.0	25		134	
Average				28	7.2	90.8	3.0	8.1	22		126	2
Maximum				31	10.5	137.5	5.6	8.7	35		152	12
Minimum				22	2.3	29.6	0.3	7.2	12		97	0

Table CH-5

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-5	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Chattooga River, Two Miles Below Bridge, Ala. Highway 68 and 16.0 mi. Below Ga.-Ala. State Line	8-13-62	3:05		--	9.9		4.2	8.0	16		73	
	8-14-62	9:20		29	8.3	106.7	3.8	7.6	15		68	
	8-15-62	8:55		29	8.7	111.9	3.7	7.7	12		65	
	8-16-62	9:20		29	7.5	96.5	3.9	7.9	12		70	
	8-17-62	9:05		29	7.8	100.2	3.7	7.7	13		71	
	8-20-62	9:55		29	7.7	99.0	2.1	8.2	9		74	
	8-21-62	9:45		30	8.2	107.4	1.7	8.3	8		66	4
	8-22-62	9:38		29	6.8	87.5	1.3	7.8	13		67	
	8-23-62	10:25		29	6.8	87.5	1.7	7.9	12		73	
	8-24-62	9:25		28	5.7	72.0	1.4	7.9	18		65	
	8-27-62	8:55		28	6.1	77.0	1.6	7.6	14		72	
	8-28-62	8:45		28	6.7	84.6	3.4	7.8	11		77	
	8-29-62	9:00		28	7.0	88.4	1.9	7.9	13		68	
	8-30-62	8:50		28	6.0	75.8	1.6	7.7	12		77	
	8-31-62	9:20		28	6.8	85.8	1.7	7.7	11		77	

Table CH-5 (Cont'd.)

Chattooga River (Weiss Lake) Study

August - September 1962

Sampling Point No. CH-5	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen Parts per Million	Dissolved Oxygen Per Cent Saturation	5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
Chattooga	9-4-62	10:20		30	8.3	108.7	2.8	8.3	9		56	1
River, Two	9-5-62	10:30		29	7.6	97.8	2.1	8.0	10		69	
Miles below	9-6-62	10:30		28	6.3	79.5	1.9	7.7	11		67	
Bridge, Ala.	9-7-62	10:00		27	5.9	73.1	2.0	7.6	12		80	
Highway 68,	9-10-62	9:50		27	7.0	86.8	2.1	7.8	12		76	
16.0 mi.	9-11-62	11:20		29	8.5	109.3	2.6	8.1	10		85	
Below Ga.-	9-12-62	9:50		28	7.9	99.8	2.4	8.3	10		86	2
Ala. State	9-13-62	3:00		30	8.7	114.0	2.2	8.3	9		82	2
Line	9-14-62	8:55		27	6.7	83.0	1.8	7.9	10		80	
	9-17-62	11:50		27	5.8	71.9	2.2	7.7	10		83	
	9-18-62	8:50		26	6.5	79.0	1.4	7.7	16		80	
	9-19-62	9:30		26	5.9	71.8	1.4	7.8	14		73	
	9-20-62	10:20		26	6.1	74.2	1.4	7.8	19		96	
	9-21-62	10:15		24	6.7	78.6	1.4	7.9	17		92	
	9-24-62	10:00		23	6.7	77.0	1.5	7.7	17		88	
	9-25-62											
	9-26-62	9:35		23	7.3	83.9	1.1	7.9	13		90	
	9-27-62	9:00		23	6.7	77.0	1.2	7.8	17		88	
Average				28	7.1	88.6	2.2	7.9	13		76	
Maximum				30	9.9	114.0	4.2	8.3	19		96	4
Minimum				23	5.7	71.8	1.1	7.6	8		56	1

Table L-1

Weiss Lake Study

August - September 1962

Sampling Point No. L-1	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Little River Embayment	8-13-62	3:00		31	10.0	133.4	3.8	8.2	14		75	
	8-14-62	9:00		28	8.7	109.9	3.5	7.6	13		60	
	8-15-62	8:45		29	10.0	128.7	3.7	7.9	10		58	
	8-16-62	9:10		29	9.8	126.1	3.7	7.9	11		51	
	8-17-62	9:00		29	9.5	122.2	3.8	8.0	12		57	
	8-20-62	9:45		29	7.2	92.6	2.2	7.8	15		60	
	8-21-62	9:35		30	8.2	107.4	1.7	8.4	11		56	4
	8-22-62	9:30		28	6.4	80.8	2.2	7.6	17		59	
	8-23-62	10:15		29	7.1	91.4	1.9	7.1	16		58	
	8-24-62	9:15		29	7.1	91.4	1.8	7.8	18		55	
	8-27-62	8:50		28	6.8	85.8	2.5	7.5	19		58	
	8-28-62	8:35		28	6.7	84.6	2.1	7.7	15		57	
	8-29-62	8:50		27	7.0	86.8	2.6	7.5	17		68	
	8-30-62	8:40		28	6.5	82.1	2.2	7.7	13		59	
	8-31-62	9:25		29	7.2	92.6	3.1	7.8	17		58	

Table L-1 (Cont'd.)

Weiss Lake Study

August - September 1962

Sampling Point No. L-1	Date	Time	Daily Discharge Cu. Ft. per Sec.	Temperature Degrees C.	Dissolved Oxygen		5-day Biochemical Oxygen Demand ppm	pH Value	Turbidity Parts Per Million	Color Parts Per Million	Total Alkalinity Parts Per Million	Phth. Alkalinity Parts Per Million
					Parts per Million	Per Cent Saturation						
Little River Embayment	9-4-62	10:05		30	7.0	91.7	3.6	8.0	13		59	
	9-5-62	9:35		29	6.4	82.3	2.8	7.7	16		59	
	9-6-62	10:15		28	5.8	73.2	3.0	7.5	23		59	
	9-7-62	9:45		27	4.8	59.5	1.6	7.4	13		57	
	9-10-62	9:35		28	7.0	88.4	2.1	7.7	10		61	
	9-11-62	10:10		29	5.4	69.5	1.4	7.8	10		60	
	9-12-62	9:40		28	7.6	96.0	2.3	7.9	9		62	
	9-13-62	2:50		30	8.8	115.2	1.5	8.3	8		62	2
	9-14-62	8:40		28	6.5	82.1	1.4	7.7	11		60	
	9-17-62	11:40		28	6.4	80.5	1.7	7.7	10		61	
	9-18-62	8:40		26	4.8	58.4	1.1	7.4	20		60	
	9-19-62	9:15		26	4.8	58.4	1.4	7.7	16		60	
	9-20-62	10:10		25	6.7	79.8	1.3	7.6	22		58	
	9-21-62	10:10		24	6.7	78.6	1.2	7.7	13		60	
	9-24-62	9:45		23	7.3	83.9	1.4	7.6	13		61	
	9-26-62	9:45		23	7.0	80.5	1.6	7.7	16		58	
	9-27-62	9:10		22	6.8	77.0	1.0	7.6	15		59	
Average				28	7.1	89.7	2.2	7.7	13		60	
Maximum				31	10.0	133.4	3.8	8.4	23		75	4
Minimum				22	4.8	58.4	1.0	7.1	8		51	2

CHAIRMAN STEIN: Thank you, Mr. Beck. That was very good. I would like to take this opportunity to commend you on an excellent and comprehensive report and a well-written report. And I say this beyond the scope of the conference. We have had the opportunity of looking at reports from all 50 states, and uniformly the reports from Alabama have been of the highest. They have been well-organized and well-written. I will say this is something for the people here to be proud of, because I think if there were a national award for the writing of technical reports, Alabama would get my nomination. I think you and your staff are to be commended for this.

MR. BECK: I take no credit, Mr. Chairman. It all goes to our staff.

CHAIRMAN STEIN: Wait. We may have some comments and questions.

Do you have any questions or comments?

DR. VENABLE: Mr. Beck, when you are down the stream and get slack tail-waters at the upper end, do you decrease, or change, or increase the stream's recovery possibilities along that stretch?

MR. BECK: That's kind of hard to answer, Doctor. It would probably decrease the chances of recovery; yes, sir -- over the same distance of flow; yes, sir.

DR. VENABLE: Therefore, the 12 to 14 miles of tail-waters from Weiss Dam that extend up the Coosa into Georgia were by election of Alabama a decrease in the Georgia section of the Coosa River recovery. Is this correct?

MR. BECK: I don't know, sir.

DR. VENABLE: How do you make that consistent with your previous answer?

MR. BECK: Sir, these data that I gave you here are actual collected data. We have attempted --

DR. VENABLE: I am not arguing with you there.

MR. BECK: We have made no attempt, sir, to go into -- I think that that will come later on maybe with some of your people this afternoon, but there are people a lot more competent in this field than I am.

DR. VENABLE: I am asking you an engineering question. If the tail-waters have a lesser recovery capacity --

MR. BECK: The tail-waters?

DR. VENABLE: (Continuing) -- than flowing waters -- slack waters in the upper end of a reservoir have less chance of recovery per foot or mile --

MR. BECK: According to what it --

DR. VENABLE: (Continuing) -- than the stream when it was previously flowing along that course; is this true or not?

MR. BECK: Well, that could be due to a lot of conditions. I mean, you would have to take a lot of things into consideration.

DR. VENABLE: Such as what?

MR. BECK: Well, such as the type of stream, its depth, how deep the water.

DR. VENABLE: All right; let's get down to specifics. There is 12 to 14 miles now of slack water from Weiss Dam in Georgia.

MR. BECK: All right.

DR. VENABLE: On the Coosa bed. Does it have the recovery capacity the Coosa River had in that same stretch before the reservoir was up there?

MR. BECK: Doctor, again I say there's people a lot more competent in this field than I.

DR. VENABLE: Well, I'm not asking them.

MR. BECK: I know, but I'm not going to pit my wits against these masters of this particular thing. They will probably come on later.

DR. VENABLE: It is true, regardless of the answer to that question, that by election on the part of a certain group of people in Alabama -- who they are is unimportant -- these slack waters were projected into Georgia by a volition on the part of the people in Alabama?

MR. BECK: I think that is a matter of record; yes.

DR. VENABLE: And that if there is this lessening of recovery capacity, this was elected by the people in Alabama.

MR. BECK: I would say so; yes.

DR. VENABLE: Thank you, sir.

MR. BECK: Yes, sir.

CHAIRMAN STEIN: Do you have any questions, Mr. Thoman?

MR. THOMAN: No, I have no questions.

CHAIRMAN STEIN: As I understand this report and your conclusions, as far as I can see, they are in pretty substantial agreement with Mr. West's report; that is, you say some industrial and municipal causes in Georgia are contributing to the pollution of the Coosa River and its tributaries so as to cause interference in Alabama due to oxygen depletion, silt loading, and discharges of untreated sewage.

The oxygen depletion is largely dealt with --

MR. BECK: Well now, Mr. Chairman, we did not study the bacteriological quality of the stream. We stayed away from that angle.

CHAIRMAN STEIN: Right.

MR. BECK: As far as our study coincided; yes, sir -- as far as dissolved oxygen and pH and total alkalinity.

CHAIRMAN STEIN: Now again, and I hope this is a clarifying question. In the construction of that Weiss Dam, at the state line, as I understand, part of that backs up into Georgia; is that true?

MR. BECK: Yes, sir.

CHAIRMAN STEIN: Did the people who built that dam obey the laws, or did they operate in any illegal manner whatsoever outside their rights in constructing the dam?

MR. BECK: Not that I know of.

CHAIRMAN STEIN: In other words, this was fully authorized by the laws of the state and the United States?

MR. BECK: The only laws that we have in the State of Alabama, as far as I know, is relating to clearing.

CHAIRMAN STEIN: Then as I understand the point, and this may be clarified, there is nothing that the people in Alabama, who created the dam -- what was that? Alabama Power?

MR. BECK: Yes, sir.

CHAIRMAN STEIN: Who created the dam, did, that wasn't perfectly legal. It was a question, as I understand it, of election and free choice that was raised.

DR. VENABLE: But by this election they terminated one safety factor that they had in recovery of the stream.

CHAIRMAN STEIN: Well, I think again -- and this is a problem, and we have discussed this many, many times in many cases, and this is quite true. This is the problem we have in pollution control, if I might say, in this country. We have a situation where in many, many parts of the country people are coming up and putting wastes into the stream. Someone would come downstream with an industry or recreation facility or a city. Suddenly what these people were doing for a hunfred years was considered no longer acceptable. Now this I think we have to look at with compassion, and no one is putting padlocks on city halls, and I don't think an industry has ever been closed up. But I think the reason that we have the pollution problems, programs in the states and the Federal Government, is largely due to this phenomenon of new interests coming into a stream and going up. As a matter of fact, I think one of the key points we had is a city in Alabama -- isn't Demopolis in your state? You recall what happened there. The Corps of Engineers put a reservoir below the city and the Alabama authorities, because of a change in stream use and recreation, decided that they needed better treatment. The City of Demopolis brought suit in the United States Court of Claims against us for a certain cause in damages, and they said the Federal Government should pay for the cost of the treatment plant.

This case -- and there have been several more like it -- has been thoroughly adjudicated, as far as I know. There may still be time left for appeal, although I would doubt it. The resolution of these cases was in favor of the United States. They held we were not liable and they just had to assume the responsibility of what went wrong.

Again I say this in trying to get an understanding of the problem, and you may be assured that there is no one more sympathetic to Demopolis than we were, and I think they should have gotten some aid. This is the difficult situation I think we face throughout the country.

DR. VENABLE: Mr. Chairman, in none of these cases though, except where there is impairment crossing the state line, is there justification for federal intervention. Is that correct?

CHAIRMAN STEIN; As I understand --

DR. VENABLE: This was a federal agency with Demopolis.

CHAIRMAN STEIN: The federal agency built the dam below Demopolis; that is correct.

DR. VENABLE: That is federal authority for intervention only in instances where it crosses the state line.

CHAIRMAN STEIN: As the law reads now, sir, we can only come in on our own initiative in an enforcement case when pollution crosses a state line. We can enter into a pollution case on any navigable water when we have a request from the governor of a state. We have had three such requests so far, and we have been in purely intrastate situations.

DR. VENABLE: You say, at this time. Do you plan to enlarge this authority?

CHAIRMAN STEIN: No, sir. As far as I know, the legislation is before the Congress and no proposals were made to enlarge the authority. This authority was established by the Congress. I think the Chairman of the Senate Subcommittee holding hearings had indicated over and over again that in the legislative considerations the enforcement authority of the United States is not to be enlarged, and that is not under consideration. I know of no serious proposal to do that.

MR. BECK: Any more questions?

DR. MYERS: Mr. Chairman, the essence of this report is intended to present factual information regarding the fact that we consider pollution is crossing the state line, without regard to its source; and we let the information stand on the basis of its presentation.

Now I would like to call, if I may, Mr. Ralph Meade, who is a businessman and State Representative from Cherokee County. I would like for him to offer a statement, and then call other persons from his locality that might be appropriate.

MR. MEADE: My name is Ralph A. Meade.

I have lived in Cherokee County, Alabama practically all my life, approximately 27 years. I am a businessman and have served in the State Legislature for the past five years.

The problem of pollution in the Coosa and Chattooga Rivers in one form or another has been recognized for many years. As a boy I avoided swimming in the Coosa because of the red discoloration caused by the discharge of wash water from mining operations in Georgia. As a matter of fact, one of the few times I can recall going into the Coosa River was the occasion of my baptism. I might should go over that again later on.

Little thought was given at that time to pollution because of the limited use of the streams for purposes other than livestock watering and a minimum amount of fishing.

With the construction of Weiss Dam and Reservoir, however, land use and much of the economy of our area has been drastically changed.

Construction of the reservoir created a vast new recreational area. Inasmuch as the river was used little before the construction of the reservoir, any pollution present at that time was not too obvious; but now the presence of pollution greatly restricts the full use of this area.

Income from boat landings and related concessions is badly needed to offset that income lost by residents whose farm land was taken as a result of the construction of Weiss Lake. Several thousand acres of our best farm land have been flooded. Some of this land yielded as much as two bales of cotton per acre and some as much as 100 bushels of corn per acre.

Since the impoundment has been completed, a number of my people have called me, expressing concern over the pollution of the Coosa and Chattooga Rivers. They have complained of fish kills, a discoloration of both streams, and in some cases they have mentioned the presence of foul and obnoxious odors in these streams. I have personally investigated at least three of the fish kills reported to me. I have seen the Chattooga River near the Georgia line green one day and blue the next day. On two occasions I have seen several thousand dead fish in the Chattooga River near the Georgia line, and on each of these occasions the water had the distinct odor of soap and dyes. A slight fish kill in the Coosa River in the vicinity of the Georgia line was reported to me in October 1961, and, according to my information, could be attributed to the release of wastes by the paper mill near Rome.

Gentlemen, the people of Cherokee County, Alabama, are concerned over the pollution of the Coosa and Chattooga Rivers, coming out of Georgia, and feel that this pollution is adversely affecting the full use of Weiss Reservoir for recreational and fishing purposes. On behalf of the people of Cherokee county we sincerely hope that this conference will see fit to recommend measures to correct this problem that now exists in Cherokee County.

CHAIRMAN STEIN: Thank you, Mr. Meade.

Are there any comments or questions?

MR. THOMAN: I have none.

CHAIRMAN STEIN: Thank you very much, Mr. Meade.

MR. MEADE: At this time I have several people I would like to call on to make a simple and plain statement. First, I am going to call on Judge Charles Formby, Probate Judge of Cherokee County.

JUDGE FORMBY: Mr. Chairman and members of the committee: As Judge Probate of Cherokee County -- that is the office in which all plats for subdivisions and deeds are recorded, and fishing licenses are issued -- and that will be the substance on which I will make my statement.

We have some 30 or 40 new subdivisions created in Cherokee County as a result of Weiss Lake. Those plats are all recorded in my office. I have frequent contact with the property owners and people who are interested in buying lots, and, without an exception, they are talking about the muddy water and the pollution of Chattooga River, and are hesitant in buying lots along those sites, but get away from that over on the clear side on the eastern side of the lake from Rome, Georgia.

In 1954 in our county we sold 1100 non-resident and resident fishing licenses. Last year we sold 12,000. So you can see that Cherokee County is moving away from agriculture and towards recreation; and, members of the committee, we feel that we have the legal excuse, a pollution problem, and we hope that you will take steps to remedy this situation.

I thank you.

CHAIRMAN STEIN: May we have your name again for the record, please?

JUDGE FORMBY: Charles A. Formby.

CHAIRMAN STEIN: Would you spell your last name?

JUDGE FORMBY: F-o-r-m-b-y.

DR. VENABLE: Ths fishing must be good, Judge. Can I come go fishing with you?

JUDGE FORMBY: I'd be happy to take you any time, Doctor.

DR. VENABLE: 1100 to 12,000; is that right?

JUDGE FORMBY: Right.

CHAIRMAN STEIN: Just a moment, Mr. Formby.

MR. THOMAN: Would you like to speculate as to any difference between the two sides of the lake in the value of land? Have you noticed any trend, or do you have any idea of the cost when these things are transferred in your records?

JUDGE FORMBY: The cost of the property? I have a rough idea; yes. The deed is supposed to recite the actual consideration, but it doesn't always.

MR. THOMAN: Would you say the land in the area where the river is allegedly polluted is less valuable than the land in the other part?

JUDGE FORMBY: It's more valuable -- more valuable in acreage, I'm talking about, before the water was backed up. In the area of the Coosa where it stays muddy and over on the Chattooga side, coming out of Summerville and Trion, Georgia, it is more valuable than say the Little River area which is on the eastern side below Chattooga. I'm not talking about the value of the property now. I'm talking about the value of the land itself.

MR. THOMAN: Yes, I know that. But what I was driving at was the value of the property now. You said people were buying up lots on the other side where it wasn't polluted?

JUDGE FORMBY: That's right. Of course, they've bought them on this side, also; but you can get a better price on the far side where it's clearer than you can in the polluted area and the dingy stream. Probably we have a gentleman who will follow me, who has a subdivision in the area that is under consideration here, that can clear that up for you.

CHAIRMAN STEIN: Thank you. Let's see if I understood that colloquy. The substance was that if the land in Cherokee County where the river was full of silt was what you considered unpolluted, the value of that land would be enhanced?

JUDGE FORMBY: Right.

CHAIRMAN STEIN: Thank you.

DR. VENABLE: Is this included in the definition of health and welfare?

CHAIRMAN STEIN: I think the land values have been included in the definition of welfare, effect on real estate.

DR. VENABLE: Individual owners, or subdivision developers?

CHAIRMAN STEIN: Both; any deterioration in real estate values, we consider that as detrimental to the welfare.

DR. VENABLE: Was this established as a deterioration in price? I understood it to be a increase in the price of both; one more than the other.

CHAIRMAN STEIN: One more than the other. By the way, I think your point is well-taken. But for the pollution and if the pollution can be removed, if real estate values would be enhanced by the removal of that pollution, that is considered a damage to welfare. This is the procedure and the theory we have gone on, and it seems to be generally accepted.

DR. VENABLE: If there is any increase, is that a factor if it doesn't increase as much as some other property.

CHAIRMAN STEIN: I don't think the increase in both pieces of property is the sale factor here. You can take two pieces of property, or one. If you had property with polluted waters abutting it or going through it, and if that pollution were abated and you could take that same piece of property and have it with unpolluted water going through it, if by removing the pollution from the water you would substantially increase the sale value of the property, it is considered that that pollution endangers welfare.

DR. VENABLE: Why?

CHAIRMAN STEIN: By the way we are administering the law. And I think the court decisions on these cases in the states have pretty substantially -- as a matter of fact, to the best of my knowledge and belief, have upheld that concept uniformly.

DR. VENABLE: It may be increased, but it can show some indications there would have been a greater increase. This is considered to be damage to the public welfare?

CHAIRMAN STEIN: That is correct, sir.

DR. VENABLE: I just want to be clear.

CHAIRMAN STEIN: That is correct, sir, because I do think that with all kinds of land, as you get a population push here, all land is going up and definitely will go up. That is correct.

Do you have any others?

MR. MEADE: Mr. Chairman, next I am going to call on Mr. Felix Mobbs of Gaylesville, who is a farmer and a long-time fisherman.

Mr. Mobbs, if you will, come around and state your name.

MR. MOBBS: I am Felix Mobbs from Gaylesville, Alabama. I'm a farmer and I fish a lots up and down these streams, and on the Chattooga River, when it's really colored and the foam follows behind your boat, you just as well should stay at home -- and when we happen to catch the water clear, it's good fishing. It's the same way over on the Coosa River. When it has that red stain in it, the fishing's no good. And we like good fishing. I fish regular, and there's several times I've been on the Chattooga River when the banks would be lined pretty well with dead fish.

That's all I have to say.

CHAIRMAN STEIN: Thank you, sir.

Is there any comment, Mr. Venable?

DR. VENABLE: No.

MR. MEADE: At this time I am going to call on Mr. W. K. Sommers, Jr. from Cedar Bluff, Alabama, who is a lumberman, and he can tell you the rest of it.

MR. SOMMERS: Mr. Chairman and members of the Commission: My name is W. K. Sommers. I reside at Cedar Bluff, Alabama. I own one of those subdivisions that is in the upper reaches of the lake, and we are having a hard time in moving this property. We have gone to considerable expense, subdividing it and building roads; and the muddy conditions that exist there are not conducive to good recreation or good fishing, either. Sometimes on Monday or Tuesday when the mining companies are not running, the water gets fairly clear; but then on maybe Tuesday night that water starts rolling in, coming out of the Etowah River, and completely muds it up, and that condition exists and goes on down as far as below Cedar Bluff.

I am also Chairman of the Water Board, and we are experiencing difficulty there in filtering out our water. It's not stable. Some days it may be fairly clear, like on Monday and Tuesday. Then this mud rolls in there and we have to continually keep our pH around 6, and it requires that we change our method of treating which is causing us considerable trouble there at the water works.

Also, I was owner of a boat dock there at Cedar Bluff, which I had to close due to the fact that the muddy water -- the people would come there, and they would look and say, "I'm not going to put my boat in that muddy water," or "I'm not going to swim in that muddy water." Consequently we had to close that at a considerable loss and it's inactive now.

CHAIRMAN STEIN: Any comments or questions?

I think there may be here -- I would just like to spotlight this, as I understand it, for the record because I didn't see this in either one of the reports. We have had a statement here of an interference with a water supply system.

Thank you.

MR. MEADE: Mr. Emmett O'Neil, from Centre, Alabama. He is a real estate dealer and President of the Centre Chamber of Commerce.

MR. O'NEIL: Mr. Chairman and members of the Committee: My name is Emmett O'Neil. I am a real estate broker and also President of the Chamber of Commerce in Centre.

I would like to state that we are proud of Georgia and we are proud of this water that's coming down, but at times it causes a little inconvenience down here. I've seen it when it was muddy, or it's not fit for any recreational purposes; and then, in dealing in real estate in subdivisions around, we have holdings and listings. We find where the water is clear that our investment is good, but some of the investments we have made where it's sort of polluted, well, we don't like to think of them too much.

So it's my honest opinion, something is causing the pollution of the water down here and we would like to see, if possible, something done about it to clear up the situation.

Thank you.

CHAIRMAN STEIN: Thank you, sir.

Are there any comments or questions?

(No response)

CHAIRMAN STEIN: If not, thank you very much.

MR. MEADE: J. Dan Stone, automobile dealer in Centre and Chairman of the Rural Area Development program in our area.

MR. STONE: Mr. Chairman and members of the Board: I am J. Dan Stone of Centre, Alabama. I don't know anything about the scientific measurements of the pollution of water, and I don't even know whether it's polluted or not; but I know when I small dead fish, I know what it smells like. And I know I don't like to go swimming and other people don't, either. They don't like to use the water for recreational purposes. When it's real muddy, I know you can't catch fish; and I don't know where the mud is coming from, but I know it's muddy. And I know we have streams feeding the lake that aren't muddy.

We've got a lot of people in the northern section of the lake that are from Georgia, and I've had the feeling since I've been at this conference that maybe Alabama is fighting Georgia. So if we had all the good Georgia people down there, helping us today, I don't think Georgia would be fighting Alabama, or vice versa, because most of the people in the area that's affected the worst are from Georgia. I'm making a guess now that more people from Georgia live in these areas, and I think that some of these people in the real estate business would bear this out, and I just hope that the Board can see fit to have some friendly settlement so that we can have a better lake and better water, and that we can in turn, turn better water loose to the people downstream.

Thank you.

CHAIRMAN STEIN: Thank you very much.

Mr. Venable, do you have a question?

(No response.)

MR. MEADE: Mr. J. B. Hunt, resident engineer from Cherokee County.

MR. HUNT: I am J. B.Hunt, highway engineer, and I've been around the Coosa River and Chattooga River and Little River for about 20 years. I've been in close contact with them for about 6 years, building roads and bridges over and around them. And I've flown over this lake since it's been backed up, and you can see in flying in dry weather the demarkation of the mud and the clear water -- and it looks nasty.

In June 1962 me and my family was around the lake on the south side, and there were dead fish, thousands of them all around bank -- and it didn't look good. And I don't know what caused it, and I don't know what causes the mud.

I know that we have to have industry. Now it was probably industry that caused it, but I think there should be some solution.

Thank you, sir.

CHAIRMAN STEIN: Thank you very much.

Are there any comments or questions?

(No response.)

MR. MEADE: Mr. A. H. Trotter of Cedar Bluff, who is a retired farmer, I guess you would call him, and a land developer.

MR. TROTTER: Mr. Chairman and members of the Committee: I am A. H. Trotter of Cedar Bluff, Alabama.

I have a subdivision on the Coosa River and we have lots of customers from Rome, Georgia, that come down and look at our subdivision and like it a lot. They like our lots and they like our roads. They would like everything -- if we didn't have muddy water.

That's about all I've got to say.

CHAIRMAN STEIN: Thank you, sir.

Any comments or questions?

(No response.)

CHAIRMAN STEIN: Thank you very much.

MR. MEADE: The next man I am going to call on is Ray Kelley from Gaylesville, Alabama; and he's the man that called me one Sunday morning and got me out of bed. And he had the boat and we rode up the river and saw the dead fish.

Ray Kelley.

MR. KELLEY: Mr. Chairman and members of the Committee: This is Ray Kelley from Gaylesville, Alabama. I know that you people here in the audience have heard these real estate people trying to sell something. I'm not trying to sell nothing. All we want is clean water down there, where our fish will live.

I have rode up the river and down the river in boats, and seen these suds and stuff roll up. The river one day would be brown back of our house. It is a pitiful condition when the fish can't survive. I've went to feeder streams and I've seen fish just come in there -- just so thick they couldn't hardly swim. And it is a pitiful condition in our rivers there, how it is; and we would like for the Committee, if they could help us, to help us any way they could on clearing that up.

I thank you.

CHAIRMAN STEIN: Thank you, sir.

Does anyone have any comments or questions?

(No response.)

CHAIRMAN STEIN: Mr. Meade.

MR. MEADE: Next, we have John Chestnut from Cedar Bluff, a hardware dealer.

MR. CHESTNUT: Mr. Chairman and members of the Committee: I am John Chestnut from Cedar Bluff, Alabama. I am in the hardware business there and I'm on the Town Council. I've lived for several years on the banks of the Coosa and I still live there on the banks of Weiss Lake.

The Coosa has been muddy for many years and it's still muddy. It comes and goes. You can see, if you look out on the water, and you can see the coloration change. You can see it coming in pockets all along. It's coming from somewhere. It's not from rain washing it in. It's from something else getting this coloration into the water.

It would help all of us in that area if we could get this cleared up in order that we might develop our recreation facilities more.

Thank you.

CHAIRMAN STEIN: Thank you very much.

Are their any questions or comments?

(No response.)

MR. MEADE: Mayor G. L. Johnson from Cedar Bluff, Alabama. Is he still here? (No response.)

We have Mr. Leon Parker, who is Superintendent of Education for Cherokee County.

MR. PARKER: Mr. Chairman and members of the Committee: My name is Leon Parker, Superintendent of Education for Cherokee County and Centre.

I am interested in the outcome of this meeting because we have one school that gets its source of water from Weiss Lake, and I feel like the condition of the water is keeping Cherokee County from growing and also our school system.

Thank you.

CHAIRMAN STEIN: Thank you.

Are there any comments or questions?

(No response.)

MR. MEADE: Mr. Chairman, we have present with us today, but they don't care to make a statement. I would like for them to stand. Mr. Tom Bradford from Centre and Mr. Roy McKinney from Cedar Bluff. Mr. Bradford is an ex-Senator from way back and we're proud to have him with us today.

I think this concludes all of the people we brought with us, Mr. Chairman and members of the Conference Committee. I would like to say that we could have filled up Rome, Georgia today; but, knowing the size of the courtroom, we decided it would be best not to take up too much time and bring too many people up here. The people of Cherokee County are interested. You can tell from the petition that was signed, and the petition stayed out only one week -- out in the stores only one week, and 800 interested citizens did sign the petition during that one week. Had it had a month or a few more days to work with it, we could have had thousands of names on the petition.

I would like to say at this time one more statement before I close, and then I'll sit down.

The land value that has been mentioned in Cherokee County, from the muddy waters and clear waters in Cherokee County on the Little River side and the Chattooga side, because of the clearness of the water -- they run together over in the southeast part of the county, I believe it is -- the land values of that area and the people that put their land up for sale -- has completely sold out. I know I bought one place in one area and every lot is gone. And nine out of ten are Georgia people, too -- I would like for you Georgia politicians to know that.

So, in closing I'll say thank you, and maybe after this meeting we will hear something.

CHAIRMAN STEIN: Thank you, Mr. Meade.

Are there any comments or questions?

I would like to say from the chair, from my point of view and I think for some others that have come out from Washington, the presentations you have made, Mr. Meade and your people, have been very instructive to us because, sitting in Washington you're sort of in a hothouse or ivory tower atmosphere as to the pollution involved. I think, unless you really get out and hear what the people are saying about the problems, you kind of lose touch and you aren't dealing with them realistically. So I want to state just for myself, and I am sure we have several others here, this has really been a privilege in being here.

MR. MEADE: Thank you very much.

As Mr. Stone stated, we are not trying to hurt anyone; but, if we can get our waters cleared in Alabama, we in Alabama will try to keep the waters clear, going on down through the State of Alabama.

CHAIRMAN STEIN: Thank you.

DR. MYERS: Thank you, Mr. Chairman.

DR. VENABLE: Before they conclude, I have an observation I would like to make and a question for the chair.

CHAIRMAN STEIN: Yes.

DR. MYERS: Mr. Chairman, we have just been having some discussion about whether we should call the remainder of our witnesses before lunch. Since we only have two, I think we will call them before we break for lunch. I would like to call Mr. Charles Kelley, who is representing our Director of our Department of Conservation. He is also representing this gentlemen who is Vice Chairman of the Water Improvement Commission. We are sorry that he could not be with us, but we are glad to have Mr.Kelley to bring the statement from Mr. Claude Kelley.

MR. KELLEY: Thank you, Dr. Myers.

Mr. Chairman, gentlemen, ladies and gentlemen:

I am representing Mr. Claude D. Kelley here today. I wish to read the statement which he prepared, and I wish it to go into the record as being his statement if that is permissible, sir.

CHAIRMAN STEIN: Without objection, it will be entered.

MR. KELLEY: The evidence presented here today by representatives of the Public Health Service and the Alabama Water Improvement Commission clearly indicates to me that the Coosa and Chattooga Rivers are heavily polluted rivers and much of the pollution that enters these streams within the State of Georgia is carried into Alabama's waters by stream flow.

As director of conservation and as Vice President of the Alabama Water Improvement Commission it is my duty to protect and to develop the water resources of Alabama to the limit of my ability. In this regard, I must take the stand that if the pollution presently originating in Georgia is reducing the water quality of the Coosa and Chattooga Rivers and Weiss Lake in Alabama below that required for the safety of human health and for recreational developments and uses, that such pollution should be corrected as soon as possible. I further recommend that a definite time limit be set to eliminate such pollution sources that presently exist.

Weiss Lake, a 31,000 acre impoundment, was constructed by the Alabama Power Company in 1961. Evidence presented here today indicates that the potential development of this lake is presently in jeopardy because of pollution. Pollution from Georgia has killed fish in Alabama and, according to reports by the Alabama Water Improvement Commission, may render the waters of Weiss Lake unsuitable for water contact sports and associated recreational uses.

Frankly, I think that the control and correction of pollution is a matter for the states rather than the Federal Government. I feel confident that the State of Georgia and its municipalities and industries on the Coosa and Chattooga Rivers above the Alabama-Georgia state line will recognize the problem and correct it so that Weiss Lake can be developed as it should be because of its tremendous value to both Alabamians and Georgians.

Thank you very much, Mr. Chairman.

CHAIRMAN STEIN: Are there any comments or questions?

(No response.)

DR. MYERS: Mr. Kelley do you want to call the next one?

MR. KELLEY: Mr. Chairman, I would like to introduce Mr. I. B. Byrd, who is Chief Fisheries Biologist for the Alabama Department of Conservation. Mr. Byrd is the man whom we depend for these fish kills when these situations occur.

Mr. Byrd.

MR. BYRD: Mr. Chairman, conferees, ladies and gentlemen:

The results of chemical analyses of water samples by the technical staff of the Alabama Water Improvement Commission of the waters of the Chattooga River, Coosa River, and Weiss Impoundment clearly indicate a decline in water quality in these waters.

The low dissolved oxygen concentrations are a continuous threat to the fish populations; and, if these low concentrations continue, they will no doubt greatly reduce the potential fish production of these waters.

I might also add that the muddy waters that are now present in the Weiss Impoundment are a great detriment to the production of fish; first, because they might destroy spawning areas and, secondly, because they destroy vital plankton which is a basic link in the food chain for fish.

Fishery biologists of the Alabama Department of Conservation have cooperated with the technical staff of the Alabama Water Improvement Commission in investigating fish kills in the Chattooga and Coosa Rivers. Numerous fish kills in these rivers have been reported by residents in the area of the Chattooga and Coosa Rivers below the Georgia-Alabama state line.

The potential of the 31,000-acre Weiss Lake as a fishing lake and recreational area is tremendous provided pollution now entering the lake is curtailed. Fishing camps are now being developed on the lake and, of course, numerous other developments.

During the first year following impoundment there were 12,000 fishing licenses sold in Cherokee County alone. This information, I think, has already been brought out. This was an increase of some 1000% over the previous year.

It is interesting, I think, to note that some 33% of these licenses were non-resident licenses and that the majority of these were sold to Georgia residents. Therefore, Weiss Lake will greatly benefit the fishermen of Georgia as well as those in Alabama because fishing areas in this section of Georgia, I believe, are quite limited.

In my opinion the potential development of Weiss Lake as a fishing lake cannot be realized until the quality of the waters of the Chattooga and Coosa Rivers at the Alabama-Georgia state line and below meet the standards that have been established by the Alabama Water Improvement Commission. These standards have previously been made known to the proper authorities in Georgia.

Thank you.

CHAIRMAN STEIN: Thank you, sir.

Are there any comments or questions?

(No response.)

CHAIRMAN STEIN: If not, thank you very much.

DR. MYERS: Mr. Chairman, I would like to call on Mr. Jim Farley, who is here representing the Alabama Power Company. I don't know whether Mr. Farley wants to make a statement or not. We would like to offer him the opportunity if he wishes it.

MR. FARLEY: Ladies and gentlemen:

My name is John G. Farley, Jr. I am a Registered Professional Engineer in the State of Alabama. I am here to speak for the Alabama Power Company, where I am employed as an engineer in the Engineering Department.

Reference has been made here today to the Alabama Power Company's Weiss Dam project which is located near Leesburg, Alabama, and I wish to make a statement with respect to that project.

First, the U. S. Army Corps of Engineers many years ago made plans for a future hydroelectric project at this Leesburg site on the Coosa River. These plans were for a structure very similar in every respect to our Weiss Dam. In 1945 the Congress of the United States approved the Corps' plans for the Leesburg project in the Rivers and Harbors Act that was passed that year. Then, in 1954 the Congress passed enabling legislation which made possible the private development of the Leesburg site by Alabama Power Company. It has therefore been a matter of public record for many years that construction of an impoundment at Leesburg, similar to Weiss Dam, would be undertaken eventually by either public or private interests.

After passage of the enabling legislation by Congress, the Federal Power Commission issued a license to Alabama Power Company to build Weiss Dam and other projects on the Coosa River in order to complete that river's development. I am sure most of those present here know that a Federal Power Commission license for a hydroelectric project is issued only after a detailed study of the project has been made. The license contains very specific requirements relating to the construction and the operation of the plants which it authorizes. The Federal Power Commission, before issuing our Coosa River license, determined that the proposed project was the one best adapted to a comprehensive plan for the development of the Coosa River. The conditions of construction and operation of the various plants, including Weiss Dam, were set forth in the best interest of interstate and foreign commerce, improvement and utilization of water power development, and other public uses, including recreational use.

Alabama Power Company has operated hydroelectric plants on the Coosa River and other streams in Alabama since 1914, and during that entire time there has been no indication that the various plants have caused anything other than benefit to the condition of the streams on which they are located. We noted in the report made by the U. S. Public Health Service that since the last survey in 1957 there has been an actual improvement in the condition of the Coosa River below Cedar Bluff in the immediate area of Weiss Dam, which we assume is attributable to the natural purification processes of Weiss Lake. This has happened, as we understand it, despite an increase in pollutional load from upstream, which is also referred to in the above-mentioned report.

It is our considered opinion that Weiss Dam, like our other projects, has resulted in an overall improvement in the condition of the river on which it is located.

We greatly appreciate the opportunity of making a statement here today.

CHAIRMAN STEIN: Thank you.

Do you have any comments or questions?

DR. VENABLE: Do you, as the Alabama Power Company, control the level of the lake, Mr. Farley?

MR. FARLEY: It is dictated in our license. It is spelled out in the license and we follow the procedure as it is spelled out.

DR. VENABLE: Do you own the shore line?

MR. FARLEY: We own only the property that is covered by the lake, plus flood rights for property -- I don't have the details here, but maybe a foot or so above the normal -- well, whatever the flood will be in a particular area of the lake.

DR. VENABLE: Do you in any way control the use of the lake for recreational purposes?

MR. FARLEY: Not to my knowledge.

DR. VENABLE: I from Atlanta could go over and put a boat on the lake and leave it there, without contacting the Alabama Power Company?

MR. FARLEY: You might have to contact some marina owner, but you would not have to contact the Alabama Power Company.

DR. VENABLE: Are there any launching ramps?

MR. FARLEY: I can't speak for that, Doctor. I don't know. There are no Alabama Power Company operated launching ramps.

DR. VENABLE: Do the marinas own the property or lease the property?

MR. FARLEY: As far as I know, the marinas own their property.

CHAIRMAN STEIN: Are there any further representatives?

DR. MYERS: Mr. Chairman, there are a number of other people here from Alabama. I would like to recognize Mayor Rutherford, the Mayor of Tuskegee, if he would stand. There are a number of others which I would like to recognize individually, but the time is very short.

I would suggest, if there are others who are going to be heard, that this be delayed until after lunch.

CHAIRMAN STEIN: Do you want to make any comment?

DR. VENABLE: Mr. Chairman, I would like to make an observation for the record and ask a question of the chair, which you may defer if you wish.

I am as sympathetic as I can be with the property owners who are faced with a muddy lake. I think it ought to go into the record, however, that all of the property owners, including the legislator from Cherokee County, referred to mud and silt; and only in one, or two, or three instances did they refer to pollution of other types than silt. I would assume therefore in connection with our interchange a while ago on welfare, that if the silt, according to the presentations we have heard, is removed from the river, there would be no longer any question of interference with the welfare of the property owners.

The question I would like to ask of the chair for reference to wherever the best answer might be is whether or not in the belief of the engineers who are qualified to say, you do not believe that there will continue to be slugs of mud coming down the Etowah and the Coosa from the method of operation of Allatoona impoundment? This is our belief.

CHAIRMAN STEIN: I think we can take that up after lunch.

To get back to the original conference, I don't believe that I have any conclusions yet because we haven't heard all the people. As far as I understood the situation here, there were three causes of complaint. One was -- and this was just one on the part of the property owners who complained, and the record will show that. The other, which we heard from the Fish and Wildlife people, among others, was an oxygen depletion which is inimical to fish life and fish propagation. The other we heard -- and again, these are just the areas that we are exploring -- the other we heard was bacteriological loadings or pathogenic loadings which might create a hazard to those coming in contact with the water in a water contact sport.

These are the three areas.

There is one other, of course, and that is the operations which may be creating silt loadings.

Mr. West, you understood the question about the problem of silt. Let's assume that we have two companies, Thompson-Weinman and what is the other one?

MR. THOMAN: New Riverside.

CHAIRMAN STEIN: Let's assume that we had adequate treatment facilities there. Would slugs and wastes or silt come down that stream because of the operation of the Allatoona Dam?

I would suggest, not to prolong this, that we leave this question until after lunch.

May we recess for lunch for an hour and a half?

(Whereupon, at 1:25 o'clock, p.m., the conference was recessed until 3:00 o'clock, p.m., of the same day.)

AFTERNOON SESSION (3:00 p.m.)

CHAIRMAN STEIN: May we reconvene the hearing?
When we recessed for lunch, Mr. West, you were asked a question. Do you think you can supply the answer at the present time?

MR. WEST: May I have the question again?

CHAIRMAN STEIN: Reply to your impression. If it is not correct, why don't you go up there and you will be further questioned?

MR. WEST: As I understand the question, I was asked if the mineral waste discharges were removed from the river, whether or not that would clean up this source of pollution to the state line; is that right?

DR. VENABLE: Whether or not there would still be slugs coming down with the operation of the dam.

MR. WEST: No, there would be no slugs coming down from operation of the dam, and the condition of the lake during the recreational season would be improved about 100%. I mean, that is as close as I can estimate it from the data we collected.

DR. VENABLE: Does this mean then that all the mineral content of the river arises from turbulence from the dam?

MR. WEST: Sir?

DR. VENABLE: Does this mean there is no mineral content of the river arising from the turbulence at the dam?

MR. WEST: The turbulence itself doesn't do that; no. But there is about 56 tons coming down in the natural waters coming down through the dam at Allatoona. That averages 54 or 56 tons per day, but it would eliminate at least 500 tons per day. So you wouldn't have any appreciable amount of silt to settle on the bottom and become resuspended and flushed down with the pulsating currents.

DR. VENABLE: This comes out of the clear water in the impoundment?

MR. WEST: Yes. This is the clear water you see. That clear water in that volume at about 12 mg/l of your load concentration contains on an average day about 54 or 56 tons of these solids per day, and each night about 500 tons are deposited in the river. They settle down and stay there until the turbine comes in and increases the turbulence, builds this up and carries this 500 tons down the river. Does that answer your question?

DR. VENABLE: I presume so. It doesn't make much sense, but --

CHAIRMAN STEIN: I think the Doctor has a valid question.

MR. WEST: I am trying to get it.

CHAIRMAN STEIN: What we are trying to do is get a factual picture. As I review it, it is this: You get what appears to be clear water in the dam. It does have natural silt in it from the run-off. This settles to the bottom or in the lower strata. When they turn the turbines on, this silt will be flushed out and go down the river. Thus, from apparent clear water in the dam, once the turbines are turned on, you are going to get a silt load in surges. However, as I understand it -- is this correct or not?

MR. WEST: No. There is no flushing of silt out of the dam. This is about the normal day in, hour by hour, quality of this water behind Allatoona Dam.

CHAIRMAN STEIN: Where would the silt come from? Let's assume there were no ochre plants. There would still be silt in the river, wouldn't there?

MR. WEST: That is correct.

CHAIRMAN STEIN: Where does that come from.

MR. WEST: It is in this water that looks clear, even this 54 tons in that --

CHAIRMAN STEIN: How does it get to look silty when the dam flushes out -- doesn't it?

MR. THOMAN: Let me say a word here. Your normal water coming out of the dam, which will look reasonably clear and not turbid, still will produce in that river about 54, 55, or 56 tons per day of silt. Now the reason that you get the turbid looking water is that during the night New Riverside Ochre dumps these 500 tons in there; and, when the surge hits it, then you get your turbid conditions.

CHAIRMAN STEIN: I think Dr. Venable has asked, let's suppose we didn't have a discharge from New Riverside Ochre. Let's suppose Thompson Weinman was doing a perfect job.

MR. WEST: All right.

CHAIRMAN STEIN: Let's suppose you had the water coming down the stream, would we still have turbid conditions at times?

MR. WEST: No. It would be clear -- nice and clear. This water --

CHAIRMAN STEIN: In the river, too?

MR. WEST: In the river; yes, sir. In the Etowah River; that's what we are talking about -- aren't we?

CHAIRMAN STEIN: Yes.

MR. WEST: Yes, that would be clear water coming down the Etowah River.

CHAIRMAN STEIN: And there would not be slugs of silt coming down?

MR. WEST: There would not be slugs of silt coming down the Etowah River.

DR. VENABLE: Isn't it true that crests come down the river on discharge?

MR. WEST: Great crests; yes, sir.

DR. VENABLE: These crests don't pick up any silt from the bottom and the banks?

MR. WEST: No. You will notice, as I calculated the silt all the way down the river, I never even included any settling of this silt in the water from Allatoona. That is the real finely divided silt that for all practical purposes doesn't settle any more. It's very little. It looks like clear water. But you can measure it and count up 54 tons. Well, that silt will not settle in the river bottom even during the periods of low flow. There is no appreciable or measureable amount of settleable material coming out of there that can settle and then be resuspended in the clear water coming out of Allatoona Dam. These are the silt wastes.

DR. VENABLE: Why is it that the Etowah has been known for years, before Allatoona Dam, before New Riverside Ochre, or before anybody else, as a muddy river. Where did it come from?

MR. WEST: I don't know where it came from.

DR. VENABLE: We heard somebody speak of it this morning, that they had never known it to be clear.

MR. WEST: Yes, but that is -- I am talking about during the recreational season of the year, during the periods of low rainfall.

CHAIRMAN STEIN: In other words, let me see again if I can understand this. If the ochre mine were not there, or had a perfect operation as far as pollution control were concerned, you would not be able to see the silt in the water, although 54 tons would be finely suspended.

The water to the naked eye would look clear from Allatoona Dam to and beyond the state line; is that correct?

MR. WEST: To and beyond Rome, Georgia. Then we would pick up --

CHAIRMAN STEIN: To and beyond Rome, Georgia.

MR. WEST: Yes -- to Rome, Georgia. That would be a fine, real clear, attractive stream.

CHAIRMAN STEIN: Are there any further questions?

DR. VENABLE: There are an awful lot of discrepancies, Mr. Chairman, but we've taken enough time on the point.

CHAIRMAN STEIN: I have been asked to inquire if there are any more people from Alabama who would wish to make a statement at the present time. If not, I will call on the State of Georgia.

Dr. Venable?

DR. VENABLE: Mr. Chairman and conferees:

I would like to make a brief statement and introduce to the group those who are here from the alleged polluters, and request the opportunity for those of them who wish to be heard individually.

I don't quite know how to present this. We would have stipulated at 9:30 this morning all of the factual data that has been presented in the six hours since that time.

We are curious about a number of things, such as a study in August 1962 being heard in conference in August 1963 with what appears to be a federal position on the degree of pollution. We would have expected this to have come much sooner. We would have expected it to be carried out by many fewer than it was necessary to send here from the Public Health Service and DHEW, but I am even more curious about the fact that nobody since August of 1962, who has been involved in this study of this problem, has made any inquiry as to what is going on in Georgia. A great deal has been going on. I think all Georgians join me in apologizing to Alabama, particularly the people of Cherokee County, Alabama, for some of the things that have happened to them.

We do not believe that these, even in August 1962, where as serious as the claim that has been made.

I would observe that most of the Federal study, as reported in this volume, relates to intrastate pollution, and that no case has been made whatsoever for any adverse effects on the health and welfare of the people of Alabama because of the quality of the water at the state line.

I admit that the results are unpleasant. I will also admit that we do not intend to continue to have the intrastate pollution that exists at the moment, but I would also be happy to tell you that all of the individuals who are included in this report have made and are making progress toward the alleviation of the pollution in what we regard to be a reasonable rate of activity.

We also know of some sources of pollution which are not included in this report, and I think it's only fair that I point out to you, Mr. Chairman, that in one way this federal study has decreased the rate at which we are able to control our pollution within the Georgia streams.

I have here a copy of a letter from one of the polluters one whose product I might say has probably received more comment this morning than any other, in which he states on July 9th, at which time he learned of the federal study, that he would not make any further progress or spend any other money in correcting his problem until after the federal study had been completed. He did wait, so far as we know, and only after it was completed has he gone ahead. So we lost six to eight months in the alleviation of this problem because of what I believe to be an unwarranted federal intervention, because I do not see there has been established any significant degree of interstate pollution in this study.

The important thing, however, is that for intrastate situations as well as for interstate, progress is being made in a magnificent cooperative effort by all of the individuals who are polluters or potential polluters, and according to our records and their commitments, each is making significant progress and making it as rapidly as we feel it is fair to expect.

I am a little uncertain as to how to proceed here.

Mr. West this morning included the name of another industry in his recommendations -- in his conclusions and recommendations of which we were not aware and which I do not believe appears in the text and as a consequence they were not notified by us of this hearing; and, as I moved earlier this morning, to delete that from the report, and the Chairman put off action on this motion, I do not know whether to include them in the list I read or not.

CHAIRMAN STEIN: I wanted to check on that, and I think the point you raise is a valid one. However, my attention has been called to Table No. 1 in the report which you have, following Page 11, where the Celanese Fiber Company has been listed in the report.

DR. VENABLE: I obviously do not deny that. They were not listed in the conclusions nor in the recommendations, and I do not see that they yet are.

CHAIRMAN STEIN: Well, the point again -- and again we have to check. I don't know as to what significance these people are or are not contributing to pollution which affects people in Alabama. Maybe Mr. West can answer that. Presumably he thought they were making a contribution. But I do think -- and this is what I would like to make clear -- I don't think that this proceeding in the way that I think the Congress conceived of the conference, or anyone else conceived of it, was in the nature of an adversary proceeding with strict pleadings.

All we are here for is to try to determine and find out facts. We get facts from our report, from yours, from the State of Alabama, and from the people we have heard here. Now what we have tried to do, as best as I know how, is to give the state conferees as much knowledge and information as we can by giving them our report as much in advance as we can, so as to get in every way we can the major thrust of what our statement is going to be. If additional information comes up, what we are dealing with here is not procedure or techniques, but we are abating water pollution.

The key question is: Does the Celanese Fiber -- and I don't want to pick on this firm -- or any other source of pollution contribute to pollution, or don't they contribute to pollution?

I would like to point out one more thing, that while we have made our statement available and will continue to do so, and we try to do it at least a month before the conference, to the states involved, I don't believe that we have the same kind of requirement for the statement we get from the states, the industries, or anyone else at the conference. We come here with an open mind, and I hope everyone else does, ready to see what is going into the streams; and, if anything is significant, I think this is what we should consider rather than raising the question of a technical point, whether it appears in a table or a conclusion or anything else.

Our purpose here is to examine the question of this pollution problem together and see if we can arrive at a factual situation, and see where we go from here. Whatever we determine about any single company will not change the fact whether that company is polluting the water or not, and after all that really is our business.

DR. VENABLE: Mr. Chairman, I think that is an excellent statement. I would agree with it completely, but the only evidence I know of relating to Celanese is in the table to which you referred, except for Mr. West's statement this morning which, if I recall correctly, he did not document. At the same time, one of your people, Mr. Thoman, answered me directly this morning, positively saying that within his definition of pollution the Army Engineers should be included in the report. And again, I would like to move that Celanese be deleted and that the Army Engineers be included as a major polluter of this river system.

CHAIRMAN STEIN: We are going to have a discussion later and we will take up these motions.

As you know, we do have a program for abating pollution from federal installations. If the Army Engineers or anyone else is contributing to pollution, you can be sure we are going to make a move to abate it. But I am trying to understand the logic of the position.

If we are dealing with every polluter and your purpose is to say that the Army Engineers are polluting and we should include them, then there is certainly no objection if this is valid. Why should any company like the Celanese Corporation be sacrosanct? If we are going to pick up all polluters, let's pick them all up -- federal or non-federal. If we are not, then let's decide what we are going to do.

I think the sole question is: Are they contributing to pollution or not?

DR. VENABLE: Mr. Chairman, I'm looking at what is supposed to be an accurate copy of the Federal Water Pollution Control Act, Public Law 660, 84th Congress, it says in Section 9, among other things, "The Secretary shall include references to any discharges that are allegedly contributing to pollution from any federal property. This is the basis of my motion on the Army Engineers.

CHAIRMAN STEIN: Sir, no one is arguing against the position and the motion on the Army Engineers. All I am saying is that when we explore this question of the Army Engineers, we have to use the same open-minded technique in considering all sorts of pollution, including Celanese. The difficulty is that I don't understand on what basis you want us to consider the Army Engineers and not consider Celanese. I would like to be consistent.

I have no objection to getting a statement from whoever knows the situation in both cases. If either one or both are polluting, they certainly should be included; but I see no basis now for drawing a line between them.

DR. VENABLE: The basis, Mr. Chairman, for drawing a line between them is that it was our understanding in the beginning that this federal study would be published, it would be furnished to us, and we would have the opportunity to invite all persons who were alleged to be polluters to the conference in order that they might make statements as to their activity. Is this correct?

CHAIRMAN STEIN: Well, here I don't want to say that it is incorrect, but this is the point -- and I am not being cagey about this -- I don't know what relationship we may have with Mr. Thoman to do this, but what you have just said is not in the law.

MR. THOMAN: I will answer exactly what has occurred on this. We furnished the report to Mr. Boston in his office. The question was raised as to whom the State of Georgia might well ask to this conference, and I believe that I told Mr. Boston on repeated occasions that he could invite whomever he wanted to; that the conference was between the states and the federal government, and that the law specifically says that the conferees can bring in whomever they wish.

Now I don't try to interpret the law, but I believe I pointed that out to Mr. Boston, that this was the usual procedure; that the states invited whomever they wanted. This varies from place to place as to whomever they want to invite.

DR. VENABLE: Mr. Chairman, we wanted to invite everybody about whom there was a conclusion or a recommendation. Until we arrived here this morning, we not only knew nothing of the method of procedure of this conference, but we knew nothing of your definitions of Celanese and the Army Engineers as polluters. You brought this into it from the federal standpoint.

I take objection to the federal position on Celanese, because it states here clearly in the report, "Undetermined amount," and I do not believe this is adequate information upon which to bring them in. We did not invite them.

Mr. Thoman is eminently correct that he told us this, and we wished to invite everybody against whom an accusation was made in this report.

Now I submit that the accusation of Celanese Fiber Company, "Undetermined amount to Oostanaula River," is not a conclusion or a recommendation.

You brought the Army Engineers into it in response to a question I made this morning, and Mr. Thoman stated positively that his definition of zero dissolved oxygen at the outlet of Allatoona Dam was polluted water.

MR. THOMAN: Sir, I think the record will say, "if damages occur." You will find the record will say, "if damages occur." I repeated it three times, and that is what the record will show.

CHAIRMAN STEIN: Rather than prolong this colloquy, I don't know that the Army Engineers were invited, too. I would like to make one thing clear. I hope there are no accusations here. This is a fact gathering operation.

Now I think you have a point. You have raised a valid point and I think we might hit both of these in series and see if we can arrive at a factual conclusion, or at least a statement from our people as to how this affects water quality in the Coosa River System.

I would like to ask Mr. West a question. On what basis did you include the Celanese Fiber Company in your recommendations as contributing to interstate pollution?

MR. WEST: Because we knew they were discharging industrial wastes into the river, and we didn't know the exact amount because we didn't make the survey. We understood and we believed that there was a significant amount of pollution, and we also had data from the Celanese Corporation indicating the B.O.D. of the water above their intake along with some B.O.D. samples collected below their discharge on the Oostanaula River, and from that information it appeared that the wastes there were about equivalent in pollutional strength to the discharges from, say the City of Rome; that is, the organic discharges.

CHAIRMAN STEIN: That is, the organic discharges from Celanese was --

MR. WEST: Roughly equivalent to the domestic sewage itself from the City of Rome, about 50,000 population equivalents; significant, but we don't know the precise relationship between this and the City of Rome.

CHAIRMAN STEIN: Again --

DR. VENABLE: Mr. Chairman, is this a valid comment on this entire report, that where we believe something exists we don't need to study it.

CHAIRMAN STEIN: Well, as I --

MR. WEST: When we do say an undetermined amount -- at the time this was written we didn't know precisely what the amount was.

CHAIRMAN STEIN: When something appears in a table as undetermined, I think -- again dealing with these scientists and engineers, it does not necessarily mean they don't mean it's substantial or non-substantial. They do have a notion. What they can't do is put a number on it.

Now again -- and I am not the man to do this -- but again, on Page 14 of the report it says, "The Celanese Fibers Company plant in Rome produces approximately 16,000,000 pounds of viscose rayon yarn per year from wood pulp, caustic soda and carbon disulfide, and 7,500,000 pounds of cellulose acetate yarn per year from cellulose acetate flake and acetone. Sanitary wastes are treated in septic tanks and discharged to the municipal sewer. Bobbin washing wastes are discharged to a natural lagoon which drains to the Oostanaula River through Burrell Creek. Other process wastes are discharged to a municipal sewer leading to the Oostanaula River."

Now again, it would seem to me that reading something like this, with a large production and wet process, or a substantially wet process, with a remark like that, I leave it to the conferees. I just want to point this up, whether this was covered in the report or not.

But the question that I have to raise, whether Mr. West knows the precise amount that Celanese Fiber is putting out or not; if Celanese Fiber is a substantial contributor to pollution, no quibbling on fine points is going to alter the fact that if they are contributing to pollution and if that is not corrected, we are still going to have pollution in the river.

I suggest that we all keep our eye on the main objective, and our objective is to identify sources of pollution, their effects, if any, their interstate effects, if any; and if they are so, try to devise an equitable method of trying to control these wastes. And if the Celanese Fiber Company is a contributor to the degraded quality of water in the Coosa River System, I think everyone is kind of deluding themselves if we think we can ignore that and get clean waters or amended system, or that we can approach this in an equitable manner and ask the other industries to clean up and ignore them.

By the same token, I think -- and we would like to hear from you again -- I would like to hear from someone on this Corps of Engineers situation, because again that was new to me, too.

Did you want to say anything further on Celanese before we go on?

DR. VENABLE: I think the one point you left out of your discussion is who is best concerned with all sources of pollution. It was my understanding that when the federal government intervened with a study, without invitation from the State of Georgia, the conclusions and recommendations of that study were the basis for this conference -- not all sources of pollution. I don't intend to sit here and volunteer to you other sources of pollution that I know about, that you don't.

CHAIRMAN STEIN: And sir, we are not urging that. We are talking about --

DR. VENABLE: You are urging that we talk about sources of pollution.

CHAIRMAN STEIN: I said -- and I think the record will show that -- sources of pollution; the damages, if any, they create; and particularly the interstate damages. The only jurisdiction we have here is dealing with interstate pollution as defined by the law, and that is pollution caused by discharges in one state which endangers health or welfare of persons in another state.

According to Mr. West, Celanese Fiber Corporation's discharges fall into that category.

I think we should, by the same token -- and we are not listing that kind of limitation here -- deal with the Corps of Engineers impoundment.

Now again, Mr. West, you can speak, yourself, or call on anyone who is the expert on this. In your opinion, is the Corps of Engineers or are the Corps of Engineers installations to be considered polluters? And in this situation we don't have the interstate limitations. In other words, the law is clear. Whether pollution from a federal installation is inter or intrastate, they have to be included.

MR. WEST: The low D.O. coming out of Allatoona Dam does damage these resources for about, as I said in the report, five to ten miles down below Allatoona Dam.

CHAIRMAN STEIN: That is entirely within the State of Georgia?

MR. WEST: That is entirely within the State of Georgia. Then the D.O. picks up again and we have -- what was it? Roughly 7.2 mg/l at Rome. This does not have any effect on interstate.

CHAIRMAN STEIN: You say, Allatoona Dam discharges do not have any effect on the D.O. at the state line?

MR. WEST: They do not.

CHAIRMAN STEIN: Again --

DR. VENABLE: Would you ask him the same question about Celanese?

CHAIRMAN STEIN: Yes, I certainly would.

MR. WEST: Well, here it is so easy to see that this does not, because the dissolved oxygen has increased again toward saturation. You have 7.2 ppm average of the Etowah and the Oostanaula, coming down to the Coosa.

CHAIRMAN STEIN: Pardon me, Mr. West. You answered the question very categorically that the Corps of Engineers impoundment releases do not have any effect on the D.O. at the state line. Will you answer the other question just as directly? Do the Celanese Fibers discharges have any effect on water quality at the state line?

MR. WEST: They have an effect on the water quality at the state line.

CHAIRMAN STEIN: What kind of an effect?

MR. WEST: There I can't indicate the extent.

CHAIRMAN STEIN: Not the extent, but describe it.

MR. WEST: Well, the organic wastes there, similar to the organic wastes of Rome Kraft and similar to the organic wastes in the sewage from Rome, all entering the Coosa River, are decomposing at a continual decrease in dissolved oxygen right down to and past the state line. From this sum total of organic wastes going into the river, of which Celanese is one, we didn't attempt to --

DR. VENABLE: What was that for Celanese?

MR. WEST: There again, we didn't attempt to pin-point the percentage of it. I said it was about equivalent -- we have to estimate -- equivalent to the organic load from the City of Rome.

DR. VENABLE: Mr. Chairman, estimates could have been made on these long before you came in to make the study. If we are going to talk about estimates, I'm afraid I'm in the wrong place.

MR. WEST: The purpose of this report is not to make estimates on the relative percentages of the load, but to show what the quality of the waters were, passing the state line, whether or not they were polluted.

DR. VENABLE: Mr. Chairman, may I withdraw my motion and suggest that these two matters are technical and not matters for us necessarily, unless they are of interest to the people who are sitting in, that we from any presentation exclude Army Engineers and Celanese and fight this out, ourselves, later.

CHAIRMAN STEIN: All right, sir. I think we should not exclude them as pollution points, but I think these are things which we should work out; that's true.

Again -- and I would like to go off the record for a moment, if I may.

(Discussion off the record.)

CHAIRMAN STEIN: Let's go on the record again.

DR. VENABLE: May we then exclude these two from our presentation?

CHAIRMAN STEIN: Well, you want to exclude them from yours.

DR. VENABLE: I would like to introduce to the conference in whatever order the conference may wish to hear them the representatives who may be here from New Riverside Ochre Company, City of Summerville. Would you stand, please, and then the Chairman will arrange the order in which you will present your reports; the City of Trion, Riegel Textile Corporation, Pepperell Manufacturing Company, the City of Rome, and the Georgia Kraft Company, Rome Division.

I think many, if not all, of these people have statements to make as to the progress that is underway with respect to their discharges which, in my opinion, are intrastate pollution and not interstate pollution; but, for the sake of your information and for the people from Alabama and for their own satisfaction, I would appreciate it if the chair would call on these people in any order you see fit.

CHAIRMAN STEIN: Thank you, sir. Without objection, I think we would like to call on the municipal people first because I think the topics of remedial action may be different.

May we hear from the representative from Trion, Georgia, first?

DR. VENABLE: Here is the list, Mr. Chairman.

MR. HARDEMAN: My name is Harry Hardeman, Mayor pro tem. of the Town of Trion, Georgia.

Mr. Chairman, the Town of Trion has no funds with which to take care of our pollution situation, and we are trying to arrange to make a deal with Riegel Textile to take care of the situation.

CHAIRMAN STEIN: Pardon me. You mean that you want Riegel Textile --

MR. HARDEMAN: We would like to work it out jointly with Riegel Textile; yes sir.

CHAIRMAN STEIN: A Joint plant?

MR. HARDEMAN: Right.

CHAIRMAN STEIN: This would be Riegel Textile's plant?

MR. HARDEMAN: Riegel Textile Corporation, Trion, Georgia, Trion Division; yes sir.

CHAIRMAN STEIN: Yes, but who would own the plant?

MR. HARDEMAN: I beg your pardon?

CHAIRMAN STEIN: Who would own the plant?

By the way, let me go off the record here.

(Discussion off the record.)

CHAIRMAN STEIN: May we go back on the record? Do you have any plans for procedures or a schedule?

MR. HARDEMAN: We have employed Mr. Charles H. Starling of Roberts and Company in Atlanta, and he is at the present time making studies. He has made studies, and I am sure he can best answer your question as to what is projected, what we have done in the past and what we intend to do in the future.

CHAIRMAN STEIN: Again, let me include this for the purpose of clarification. Who has employed the engineer; Riegel Textile, or you, or both?

MR. HARDEMAN: Riegel Textile.

CHAIRMAN STEIN: And the engineer in looking over the situation has included the Trion discharges in that, or will be doing that?

MR. HARDEMAN: That is correct.

CHAIRMAN STEIN: Do you have any questions?

MR. THOMAN: No questions.

DR. MYERS: No questions.

CHAIRMAN STEIN: Is there anything else?

DR. VENABLE: Mr. Chairman, I think I ought to say for those who don't know him, that Mr. Roy Boston, who is sitting next to you, is Director of our Environmental Health Branch, and Mr. Byers, between Mr. Boston and me, is Director of our Water Quality Service. If there are any questions for either of these gentlemen by anybody, they will be glad to answer them.

CHAIRMAN STEIN: Thank you. Again for information, is there, Mr. Boston, do you think there is a possibility of indicating when this plant might be constructed? Do you have any notion of a schedule?

MR. BOSTON: We do not have specific dates. We have been advised by Riegel in Trion that this combination is being studied now by the consulting engineers, and we think in our contacts with the consulting engineers that reasonable steps have been taken. Of course, I would like to say this, that we follow through on surveillance on these intrastate pollution problems constantly, and not just by dates. There might be circumstances arise that require a sooner date than they may want to establish, but we are constantly reviewing these and determining whether the progress is reasonable or not, as we go. If it is not, then we so notify the alleged polluters and work from that standpoint.

CHAIRMAN STEIN: The point that I am directing these questions at, there is something in the federal statute, I think we should indicate -- the law says that if the Secretary believes upon the conclusion of a conference or thereafter that effective progress toward abatement of such pollution is not being made and that the health or welfare of any person is endangered, he shall recommend, and so forth, to the appropriate state water pollution control agency that they take the necessary remedial action.

Now given the assumption that the Secretary might believe at the conclusion of this conference that pollution subject to abatement under the Act is required and that he may want to make a determination, as he has to under the law, whether effective progress is being made, it has been so, I think, with every Secretary we've had -- and we've had quite a succession by now -- that the first question they ask is the time table or how long it is going to take before they can expect financing to be arranged and the plant in operation.

This is something we have to go back to our Secretary with and the question, I know, is going to be asked. Invariably, I might say, when something reasonable has been proposed by the State, the Secretary of our Department has endorsed that reasonable proposal: And I would like to see how definite we possibly may get to that because this is the situation I am going to be faced with when I get back to Washington.

MR. BOSTON: Mr. Chairman, as Dr. Venable pointed out here that we, in administering our own duties and responsibilities under the Georgia law, think the information that we have received is reasonable progress. Now to carry out the dates, as you requested, and other factors, perhaps you might want to elicit that from the City of Trion or Riegel Textile Corporation.

CHAIRMAN STEIN: That might be appropriate when they get up. But I wish all the people, and if Riegel has appointed the engineer, I think we can wait until Riegel gets up; but I think all of this might be helpful where this can be adduced for us to have that in order that we can facilitate this determination that we know the Secretary is going to have to make.

DR. VENABLE: Mr. Chairman, can you give us a guide line by which we can make such estimates before you have an engineering report on what you need to do?

CHAIRMAN STEIN: Generally speaking, sir, I think the scope of the problem or the magnitude of the problem on construction can be fairly well determined in a time schedule by regulatory authorities, as a matter of fact, by municipalities and industry. All I can say, Doctor, is that through the length and breadth of this country in many, many states, time schedules have been set up for rather large cities, cities as large as St. Louis with a $95 million project, arranging for financing, plans and construction prior to the development of the plant. This is one thing about the engineering profession that I think they can be proud of, in that they can look at a project and determine within limits the magnitude of the project when they can do it.

I think in terms of a time schedule we are talking in terms of years; two years, three years -- and not a specific date. I think -- and this is what I point out -- that I always think that the -- when any reasonable recommendation has been made by a state agency, the Secretary has adopted that, and he has leaned over backwards in giving as much time as possible. I am sure that he reluctantly would feel that he had to establish a time table unilaterally. He would much prefer to get a recommendation from a state water pollution control agency or a state health department and say that that department is running a reasonable program and he is endorsing and backing that program. This is why I raised the question, but time schedules have been done in many, many cases in many areas.

Just as a specific example, I think if you will look at the Board of Estimates' report for New York City, where they are in a multimillion dollar sewage construction program, you will find estimates way back for ten years, and the plans are not drawn yet. You will find in the States of Maine and New Hampshire that they also have time estimates for ten years, and the plans have not been drawn yet.

I wonder if we can call on Summerville, Georgia?

MR. ESPY: Mr. Chairman, before I appear for Summerville, Riegel and Trion are so closely connected, I believe that Riegel would like to be heard.

CHAIRMAN STEIN: Pardon me. Would you identify yourself?

MR. ESPY: I am T. J. Espy, City Attorney for the City of Summerville, Georgia. Riegel would like to be heard from since they are in the same area.

CHAIRMAN STEIN: I think that would be entirely reasonable. Thank you, sir. May we hear from Riegel Textile?

MR. ROBERTSON: Mr. Chairman and conferees: My name is W. F. Robertson. I am Vice President, Textile Production, Riegel Textile Corporation.

I think the information, which many people here already know, we've been on this river for 118 years, since 1845, and we have been having our effluent going into that river since that time. I realize that the river conditions have changed and that situations do arise, and we have a serious situation on the river.

This does not mean that we necessarily agree with all of the statements in Mr. West's report. To the contrary, we disagree with some of them very strongly. However, we are aware of the conditions and we have engaged competent engineers, as we have told the authorities of the Department of Health in Georgia. We have employed these engineers to analyze our wastes and to advise us what action needs to be taken, if any, in our effluent. We have also assured the officials of the Department of Health of Georgia, and we assure you today, that when those determinations are made, Riegel Textile Corporation will take corrective measures; but, until they are made, we do not know what to do.

Now to give you some idea of the complexity of our problem, we have over 300 different organic chemicals in our treatment of cotton textiles. We know how to use them on textiles, but we don't know how to use them in a river. That is why we have hired competent engineers.

I certainly can't give you a schedule. I can't get that technical. I've heard you often say let's stay from technical matters, and I am just not in a position to be technical today. But I am giving you all the assurance we can give you that if and when determinations are made, we will take the necessary action.

CHAIRMAN STEIN: I agree with practically all you say. I recognize the problem and I am sure that this will be done.

Now do we have any comments from Alabama?

DR. MYERS: No.

CHAIRMAN STEIN: Mr. Thoman?

MR. THOMAN: I have a question, Mr. Robertson, on your contract with the engineer. When does it call for the production of a report?

MR. ROBERTSON: It doesn't call for one. We have asked him to survey the situation and we have asked him to let us know as soon as he can, what he would recommend, his action. He has told us that within three to six months, he hoped to be able to set up a pilot plant; but, until that time, he had to correlate a great deal of information, and there is still nothing that technical, specific or detailed as yet.

MR. THOMAN: Do I understand you correctly that he would first set up a pilot plant?

MR. ROBERTSON: He would first analyze our effluent in the various stages of our effluent, which it varies in our plant considerably from one area to another. We have many different chemicals; some compatible and some incompatible. Those will have to be analyzed in the laboratory.

As I understand it -- now I am not a water sanitation engineer -- as I understand it, he's got to know what's there to know what to do with it; and, to know what to do with it, some of these chemicals are entirely new to him, too. Some of them are new to us, and they've got to be tested; they've got to be tried. I mean, sanitary sewage is one thing when you've got about one major product going into it; but that is not true of industrial wastes. We don't have the same uniformity.

CHAIRMAN STEIN: Let's try to look at this again. By the way, you can be assured I am very sympathetic. I know your problem and I know you are making an effort, and I know it isn't an easy one. This is a very difficult thing to do. I might say this is particularly a problem with an industry that has been in an area for a long, long time, and suddenly you get faced with a situation like this, which presents an extra burden on the industry. I think possibly one of the best evidences of good faith and sincerity is the fact that Riegel and the community are getting together to try to work out a joint plant, which is a very good idea.

MR. ROBERTSON: Mr. Chairman, we have not any specific plans. You read our statements and you can realize what planning can be, but it seems ridiculous for a small community there and a large industrial plant to try to set up different stations. We have assured the Department of Health of Georgia that we will work with the City of Trion and that we will see that the matter is corrected. We have worked with them -- I think that I have been to see Dr. Venable -- you say, "Let's look at this again." He hasn't let me look away from it for about a year and a half now. So I can keep looking at it as long as you want.

CHAIRMAN STEIN: I am sure this is the case.

By the way, many cities and industries, unfortunately, to my mind, have set up separate plants, when they really didn't have to or shouldn't have done it. But here is the situation. Let's assume -- and I just make this assumption at this point for the sake of argument. Let's assume for the sake of argument, as indicated in Mr. West's report, that you are contributing substantially to the pollution at the state line. Let's assume that Alabama, as they have indicated, feels that they are entitled to a certain quality of water. The question we have to ask ourselves is: How long does Alabama have to wait? And the answer to that is a reasonable time.

The next question is: Who determines what is reasonable, or whether good progress is being made? Now I think again, the evidence that most of us have seen on that question is for industries or municipalities, and I would say the vast majority of state water pollution control agencies think that the best indication of this is whether you have a time schedule for remedial action or not.

The point comes up here that six months passes, or say a year passes, and the plans are not completed yet. If you have a time schedule in acquiring your setup, there may be good and sufficient reason why the plans aren't completed. The technical problems may not be solved, and no one can make anyone do the impossible. But the point is, without those guide posts in time, I think the public in the other state and the regulatory agencies are going to have this little tickler for them to indicate whether reasonable progress is being made. In our society -- and I say this in all candor -- the question is, I don't think that we are ever allowed in the federal establishment to make a reasonable judgment on whether I'm doing my job. We have a hundred senators and 435 congressmen looking down our throat every day, and I don't think they would like it. When they ask us to clean up pollution from a federal installation, they ask us to produce a time table.

Now by the same token, I think this is the general pattern in most states. I am suggesting that we might try to think and see if we can possibly come up with some indication of when we can expect that, except my testifying to your good faith -- which I would be happy to do.

MR. ROBERTSON: Mr. Chairman, let me say this. Accept the good faith, and also accept the complexity of the problem. Now to ask me to come up today with a schedule is like asking me to walk around with no legs. I can't do it, and neither could you, with 400 senators and congressmen asking you to do it. I mean, I am asked for a schedule.

Now we are paying engineers -- and they don't come cheap. We are not willing for them to work, without giving us a schedule. We have promised the Department of Health of Georgia a schedule, and we will give them one when we have one. But we can't make one up. We can only tell you we have hired engineers, we are paying them by the month, and we want that many months just as short as we can make it. And we are going to get a schedule as soon as we can, and we will submit it. We want a reasonable schedule from them; we want to get it. But in our society, sir, to which you referred, you are saying that the State of Alabama is asking us for reasonable water. Reasonable water for the life of fish, for the maintenance of industry and for the taxpayers -- there are a great many angles that come into whether it's fish. I don't know what they consider reasonable, and I would be far from sensible to stand up and assure you today that we will give water to Alabama that they consider completely suitable and reasonable for them, because I happen to know that in the State of South Carolina what a small amount of Grade A water there is there.

When they talk about human participation in water sports, they are talking about pretty pure water -- a lot purer than I expect is in the effluent of some of the cities of Alabama. So what is reasonable, I don't know; but I have to leave that to our engineers, sir.

CHAIRMAN STEIN: I think, at least speaking for myself, that we are in complete agreement, except as to one point. You see, you have said that you expect, when you get the results, to put in treatment. I think we are just talking about a date, and I am not saying whether that treatment in all respects is going to be satisfactory to Alabama, or to Georgia, or to you, or to the federal government or anyone else. The point is, I think that generally speaking, wherever an engineer is hired, he will know when they are going to give an engineering report and whether they are going to get a schedule or not.

MR. ROBERTSON: We are going to get a schedule, sir. What length of time do you consider reasonable? You are the chairman here. You tell me.

CHAIRMAN STEIN: No; don't. I can't answer this question.

MR. ROBERTSON: I can't either.

CHAIRMAN STEIN: This is what I am asking for you --

MR. ROBERTSON: I can assure you, I'll get a schedule.

CHAIRMAN STEIN: Okay. The point is, when can you announce when you are going to get the schedule? How long will it take?

MR. ROBERTSON: Twenty-four hours after the engineer gives it to me, sir.

CHAIRMAN STEIN: No. When can that engineer file a report with you whether he is going to give you a schedule or not? Can't we get a prognosis on this? is what I'm saying.

MR. ROBERTSON: Perhaps we can, but I can't now. I don't have it.

CHAIRMAN STEIN: This is --

MR. ROBERTSON: I would certainly give it to the Department of Health of Georgia as soon as I get it.

CHAIRMAN STEIN: That's right.

MR. ROBERTSON: To the conferee there.

CHAIRMAN STEIN: Well again, you see, this is the situation we are going to be faced with. The question we are going to have is whether effective progress toward abatement of the pollution is being made. I think the question that is going to be asked is, "Okay, Riegel Textile is working. You say they are fine people. Your endorsement of the work is probably what you say it is, possibly; I don't know -- but when are they going to do it?" Now I --

MR. ROBERTSON: We are doing it now, sir. You can put that in your report with absolute accuracy.

CHAIRMAN STEIN: Can't we --

MR. ROBERTSON: We are taking samples every day from four stations on the river. We've got laboratory analyses going on every day.

CHAIRMAN STEIN: Can't we get a date when we can get an engineering prognosis from the engineer?

MR. ROBERTSON: Yes, sir, when we get that, you will.

CHAIRMAN STEIN: When can we have that?

MR. ROBERTSON: They haven't given me a date.

CHAIRMAN STEIN: Supposing we don't have it now. Can we get a date within a short time from your engineer when he can tell you he can give you -- when he estimates he is going to give you a prognosis?

MR. ROBERTSON: Mr. Chairman, I can ask him for it, sir. And I would think he could give it.

CHAIRMAN STEIN: This I think so.

MR. ROBERTSON: And I will be glad to give it to Dr. Venable.

CHAIRMAN STEIN: Because this, I think, would be very helpful to all concerned.

MR. ROBERTSON: We certainly want to be helpful.

CHAIRMAN STEIN: This is not the point. The point is, we are not looking for this in the sense of harassment or anything. We are looking for this for the purpose of writing a definitive report.

MR. ROBERTSON: Would an estimate be all right?

CHAIRMAN STEIN: Yes.

MR. ROBERTSON: The reason I ask that is because I've asked Dr. West about some of the things in his report. He says, "Of course, they are only estimates."

CHAIRMAN STEIN: All we want is an estimate.

MR. ROBERTSON: Now if this hearing is based on estimates, I don't know that I can give you a precise schedule, but I'm sure I can give you an estimate.

CHAIRMAN STEIN: This is all we are asking for, sir.

Now let me tell you. We have had involved in these enforcement problems or these conferences about 500 industries. I think the record has shown we have never closed an industry, or, I think you could very fairly say, hurt an industry economically. There are built-in safeguards. The first time we do that and we go to court, we're going to be thrown out. This is not our purpose.

We are going to make reasonable approaches. Now I am not asking you for this time operation for the purpose of pushing toward an impossible. I just would like an estimate, or I think we would like an estimate of what you considered to be the possible, with the recognitions that if additional factors should show up, this thing will have to be re-evaluated.

Now we all recognize -- anyone who has worked with industrial wastes recognizes that you just don't push buttons and come up with a solution. But I think, to go back, the Secretary is going to say -- and he's a pretty wise old Secretary -- he says, "What is Riegel talking about? Two years, three years, five years, ten years, or twenty-five years? Give me an idea; what ball park are they in?"

MR. ROBERTSON: We'll give you an idea.

CHAIRMAN STEIN: Because if I can't tell him that, then he is going to tell me, "Get the next plane and go back down to Georgia, and you had better start working."

MR. ROBERTSON: I want to assure you that we want to be helpful, and we can give you that kind of information, as long as you understand it's an estimate --

CHAIRMAN STEIN: Right.

MR. ROBERTSON: (Continuing) -- to the best of our knowledge at the time.

CHAIRMAN STEIN: Right. Thank you, sir. Now may we call Summerville?

MR. ESPY: I am T. J. Espy, City Attorney for the City of Summerville. Mr. Chairman, gentlemen from Alabama and from Georgia: Well, I've had a rather liberal education here today. I didn't know what I was coming down for, but I've enjoyed it immensely.

I think Chattooga County people are using Weiss Lake more than anybody else. I just happened to look in my pocket and I'm the beneficiary of one of these little tickets from Alabama that says that I can fish down there at Weiss Lake; one of the 12,000 he was talking about. And it's darned good fishing, let me tell you. Come on down and join us. And incidentally, I've fallen into the river several times down there. I'm getting along pretty well. I don't feel any illness yet from it.

I'm not trying to be facetious, gentlemen, but it's a lovely place and it's a good place to fish. I didn't want the people to think here that the thing was drying up and the fish were all dead, because there's an old bass down there that I've been trying to catch for about -- I don't know how long. Two weeks ago he broke my line twice. I'm going back September 21 and see if I can't get the rascal.

I've been especially interested in the definition of rivers. I think Dr. Venable brought it out that "Etowah" -- I've heard it all my life -- it means "muddy river."

You might be interested to know that "Chattooga"-- at least now, gentlemen, there might be a little error here somewhere -- we've got two Chattooga Rivers in Georgia, and I wondered if you were familiar with that; one in northeast Georgia. However, I presume that you are talking about our river down here that runs through Summerville, Georgia. The Indians called that "Chicken Creek." That's what "Chattooga" means. It's an interpretation by Sequoya, who resided at Menlo.

The City of Summerville, gentlemen, is very vitally interested in the problems concerning our river because it's one of the best bass rivers east of the Mississippi River. We are dumping raw sewage into the river, and have been since the city had a sewage system, and I'm afraid to say how far back the sewage system started -- whenever Summerville Manufacturing Company began, whatever time that is, they developed a sewer system and we've been dumping ever since.

Whether or not it actually affects Alabama I am not too sure from this report. I have my serious doubts that we are contaminating the Alabama line or Weiss Lake. Of course, as I said, I've fallen in the thing; I've swam in it; I've fished in it; I feel no ill effect. The fact is, I've got a little piece of property down there on the thing, myself. Just to tell you the truth about it, I'm going to build a cabin down there.

But we are concerned concerning Chattooga River because it is our river and we want it cleaned up. We have employed a group of engineers, Williams, Weiss & Barnham, and they have been instructed by the City Council to proceed forthwith to give us a master plan for our city, to give us a plan concerning the various mills in our city, what they are doing, what it will take to correct the situation for whatever they are putting into our sewer system. All of it goes into our system and then is fed into the river. As to the time element, the gentleman is here, Mr. Barnham. Possibly he can give you some information about that. I'll be glad to ask him to come up and answer any questions because I cannot tell you, myself. I do not know.

If and when -- not if -- but when we get this plan, then we are going to take a look to see where we can find the money. I got to thinking a while ago -- if we could just transport Chattooga River and Summerville over to Saigon and Viet-Nam, we could probably get that 100% grant that we need to get this thing done.

I believe that 90% of the problem of all these people that are in here is that one little thing. If we had that, I don't believe we would have any problems today. Of course, that will face us, I am sure, at that time; but we will do our dead level best to meet it when the time comes.

So at this time I would like to ask Mr. Barnham, of the firm of Williams, Weiss and Barnham, to come forward and answer your questions.

CHAIRMAN STEIN: Let me go off the record again.

(Discussion off the record.)

CHAIRMAN STEIN: On the record again, please.

Mr. Barnham, do you have any notion as to what the time schedule might be on the Summerville situation?

MR. BARNHAM: Mr. Chairman and conferees:

We have just started this job. We don't anticipate any great difficulty. We hope to have the preliminary planning done six months after approval of the planning grant, which we are now applying for through the Community Facilities Administration.

In that application we have to state a target date for the start of construction. It's the same story; you can't construct until you have the money for it. The construction of a sewage treatment plant in the State of Georgia is keyed directly to the allotment of federal grants under Public Law 660. The reason for that is when a municipality, which has no extra money laying around, knows that they can get 30% of what dollars they are going to have to spend, they are not going to move until they get that 30%. We don't know when our 30% will be made available. Should it be made available in any reasonable time, we should be able to start construction in 1966.

CHAIRMAN STEIN: That is, I think, a fair statement.

Do we have any comments or questions? Alabama?

DR. MYERS: No questions.

CHAIRMAN STEIN: Mr. Thoman?

MR. THOMAN: I have none.

CHAIRMAN STEIN: Thank you, Mr. Barnham, very much. May we hear from Rome, Georgia? Let me go off the record again.

(Discussion off the record.)

CHAIRMAN STEIN: On the record.

Sir, would you introduce yourself?

MR. HAMLER: This is Bruce Hamler speaking for the City of Rome, City Manager.

About not quite two years ago, we employed Robert and Company of Atlanta to start a survey of our problems here in Rome, and I'm going to have to admit that we are not like some of these others. We know exactly what we are putting in the river, and we know about what we are going to have to do to get it out. Our report in that preliminary report should be ready within the next week. They have promised us that they will be up here with it.

We realize that there is federal money available, and we intend to get all we possibly can to help us with it. Although I don't think we have any definite target date, we hope to try to get under construction sometime next year.

CHAIRMAN STEIN: Thank you.

By the way, for my information, do you have any notion? What kind of treatment are you thinking of?

MR. HAMLER: I think at the present time we are thinking about secondary treatment.

CHAIRMAN STEIN: Just straight secondary without chlorination?

MR. HAMLER: With chlorination.

CHAIRMAN STEIN: Secondary plus chlorination?

MR. HAMLER: That's right.

MR. THOMAN: Mr. Hamler, does this much maligned Celanese Fiber Company -- they dump into the city sewers at the moment at least a portion of their waste. Are you going to take them through the treatment plant, that part?

MR. HAMLER: I think I am correct on this. We are at the present time, I think, taking care of their village; and the plans are -- we have a combined line that we both use for part of our North Rome sewage and Celanese's effluent from their village. The sewer does come down in one pipe, and we are going to combine -- they are already combined, but we will probably have to go up there and pick them up.

CHAIRMAN STEIN: This may solve a question. Does Celanese go through a city-owned pipe?

MR. HAMLER: No, sir; not with their waste.

CHAIRMAN STEIN: Pardon?

MR. HAMLER: Not with their waste.

CHAIRMAN STEIN: Not with their waste. Do you expect them to go through the city-owned pipe after you get this?

MR. HAMLER: We are talking about the sanitary sewage only.

CHAIRMAN STEIN: Yes. How about their other wastes; you have no plans for treating that?

MR. HAMLER: For the other wastes they have their own lines.

CHAIRMAN STEIN: You are not planning on picking that up for treatment in the municipal plant?

MR. HAMLER: No, sir.

CHAIRMAN STEIN: Okay; there is a way out. You know, the rule is that if an industry puts its wastes into a municipal sewer, the municipality is responsible and the industry has absolved itself of all technical and legal responsibilities. We've got a little of Celanese out -- domestic wastes, but we are still stuck with the other one.

Thank you, sir.

May we hear from Pepperell Manufacturing Company?

MR. RODGERS: Mr. Chairman, I am Jack Rodgers. I am an attorney at law in Rome, Georgia, representing the Pepperell Manufacturing Company.

The Pepperell Manufacturing Company some time back received a letter from the Public Health Service, in which it stated that it did not believe that they had any particular problem.

Since that time and until just a few days -- I say a few days ago -- a short time ago, they were not particularly concerned with the matter. After that, Dr. Venable took it up with them, and since he discussed it with them they have been working with him and his Department in an effort to determine where they are and what will have to be done.

That's about the situation in regard to that.

MR. THOMAN: Sir, are you familiar with who wrote a letter to Pepperell, telling them they didn't have any problem?

MR. RODGERS: We have sent for that letter now. It will be here in a few minutes.

MR. THOMAN: I mean, we have no right to ever tell anybody anything like this. This is the reason I'm amazed.

MR. RODGERS: Well, we will have the letter here in a moment.

MR. THOMAN: I am amazed.

CHAIRMAN STEIN: Do you have any plans? You mean, you have just thought about your waste treatment problem with Pepperell?

MR. RODGERS: Well, they have no particular plans for any treatment at this time. Some years ago Pepperell built the sewage treatment plant that is now in Lindale, and gave that to the county. That takes care of the sanitary sewage, and the only sewage now from Lindale is the industrial wastes, which we don't really think presents any particular problem.

CHAIRMAN STEIN: Well again, and this --

MR. RODGERS: We don't have the same process there that they have at some of the other textile plants.

CHAIRMAN STEIN: Again, let me indicate this is a technical question and obviously I am not going to be in a position to judge this one way or another. But as I understand our technical report, it says that Pepperell Manufacturing discharges contribute to the pollution problem and it persists to the state line. Now again, this is a factual situation. If this obtains, I think some thought should be given to correcting it.

MR. RODGERS: As I said a moment ago, Pepperell is working with Dr. Venable and his Department and are now submitting reports to him of the various factors concerned. When they determine what is necessary, if anything is, then some steps will be taken.

MR. THOMAN: I am reading this report, which is dated January 1963. In the conclusions on Page 71 it says:

"The Coosa River and tributaries were polluted by sewage and industrial wastes from the Pepperell Manufacturing Company at Lindale, and associated industries, and particularly by the Rome Kraft paper mill west of Rome."

I further understand -- I forget exactly when these were furnished to Mr. Boston -- but it is further my understanding that Mr. Boston's office furnished these to every industry named in the report. Is that correct, sir?

MR. BOSTON: This report?

MR. THOMAN: Yes, sir.

MR. BOSTON: Yes, sir.

MR. THOMAN: So how Pepperell --

MR. RODGERS: It doesn't attempt to say in there how and in what way Pepperell is contributing to it. It does not point out one single factor that Pepperell contributes. It just makes the broad conclusion that Pepperell contributes; and, if you will look at the D.O. Tables that he has in here, you will see that below the Pepperell discharge, or below Silver Creek, that the D.O. is up considerably above 4. As a matter of fact, it is 7.-something and it is not below 6.0 and was never below any of them on any of the tests.

CHAIRMAN STEIN: Here's the Table here. I am beginning to understand this now. First, as I understood you, you said you didn't know about this until the other day.

MR. RODGERS: That what?

CHAIRMAN STEIN: That you didn't know about this until the other day. Now they have made a broad statement. But as I read this, and if I am not mistaken here, it says, "Pepperell Manufacturing Company - 5,000 population equivalents of textile waste." That is on Table No.1 that appears after Page 11. Evidently, Mr. West and the other people who prepared the report thought this was sufficiently significant and that you were sufficiently close to the state line for this to be a contributor to interstate pollution. Again, this is a technical matter.

It doesn't seem to me in any event, by the way, that this is a very big problem. Is it?

MR. RODGERS: I don't think it is, either.

CHAIRMAN STEIN: 5,000 population equivalents.

MR. RODGERS: As I said, they are working with Dr. Venable and his Department and are submitting reports to him that he is requesting. When they determine what is necessary, then steps will be taken.

CHAIRMAN STEIN: Well, I am sure, and let me say, we've got I think two dates put up from some other people here; one in 1966 and one in 1964. If anything has to be done -- and I am not again pre-judging -- if anything has to be done at the Pepperell plant at Lindale, with a population equivalent of 5,000 and I assume that there aren't any exotic wastes, but there are just straight textile wastes, that we pretty well know how to handle; I would assume that any remedial measures you might take certainly can be accomplished commensurate with the others. In other words, they are not going to leave you behind.

MR. RODGERS: Pepperell has competent engineers there in its employ and they are now working with Dr. Venable. I am not doing the testing. I don't know any more about it.

CHAIRMAN STEIN: Do you want to say anything about that?

DR. VENABLE: Mr. Chairman, I would like to ask for your source of information on how easy it is to know how to treat textile wastes.

CHAIRMAN STEIN: This is what I asked. I didn't put that in to question the statement. I asked the question of Mr. West, and he said yes.

DR. VENABLE: I would like for Mr. West, then, to furnish us this information. It has not been available to the Public Health Service heretofore.

MR. WEST: What is that, sir?

DR. VENABLE: All these simple answers on how to treat textile wastes, that you answered the Chairman by saying they were available.

MR. WEST: The question was asked: Is this normal textile waste, and it is my understanding of the company that it is a normal textile operation with the normal textile wastes.

DR. VENABLE: That was the way I understood it, but the Chairman said you said it was easy -- and I thought he said it.

CHAIRMAN STEIN: That's right. Wait. It would be -- let's rephrase it. If I'm wrong on this, this is a very good point, Doctor. Would this waste from Pepperell Manufacturing, the 5,000 P.E., be difficult to treat? Do you think that is going to present, on the basis of your knowledge, any special problem?

MR. WEST: Textile wastes have been treated. Am I to say how easy or how difficult it is? Am I to design this plant?

CHAIRMAN STEIN: No.

MR. WEST: That isn't my function here.

CHAIRMAN STEIN: That's right.

Doctor, I want to make it clear that I am certainly not competent, nor did I make the statement. I just asked whether this was amenable to treatment; and, as I understood the answer from the technical people, textile wastes have been treated. They are amenable to treatment. On the basis of my experience when you have a waste that is amenable to treatment, then you don't have a tremendous loading; but if you have something relatively small, like 5,000 P.E., this presents a simpler problem than a loading that runs into the millions.

May we hear from the New Riverside Ochre Company?

DR. VENABLE: As far as I know, they are not here, Mr. Chairman. I can tell you that they have again begun activity, which they stopped last July when they found out about your study. As far as we are able to tell you at the moment, their renewal of activity is in a satisfactory direction, as far as we know, and this will continue until they achieve results. We did not know whether they would be here today and we are not prepared to speak in detail.

CHAIRMAN STEIN: I called on them just for purposes of this record here, the man from Summerville here. Are you taking into the city plant, or will you take in the Montgomery Knitting Company and Summerville Manufacturing Company? Are those two plants to be included in the city system?

MR. ESPY: We don't know until our engineer tells us. At present they are dumping into our sewer system now, but we may have to get them out. We don't know what will happen.

CHAIRMAN STEIN: Well, that will present another problem. But for the present time it is still a municipal problem.

MR. ESPY: They are dumping into our system now.

CHAIRMAN STEIN: Right.

MR. THOMAN: Mr. Chairman, I would like to ask what the nature of the action is that New Riverside Ochre is taking.

MR. BYERS: We have a picture of the dam that they are constructing at this time.

MR. THOMAN: How large a holding lagoon, or whatever they are putting there, or settling basin are they putting in? Do you have the design yet on that?

MR. BYERS: When they get it through, we will see.

MR. THOMAN: You mean, they haven't submitted plans to you at this time?

MR. BYERS: No.

MR. THOMAN: How could we make a determination of adequacy if we don't know what they are putting in?

MR. BYERS: We know what they are putting in. You've been talking about it all day. The adequacy will determine when they take it out. We would check what comes out after they have completed it.

CHAIRMAN STEIN: May I go off the record a moment?

(Discussion off the record.)

CHAIRMAN STEIN: On the record again.

I think the one we have left, and I purposely left this because this may be one of the more complicated ones, is the Georgia Kraft Company, Rome Division. I think all the others on the list have been called.

May we hear from the Georgia Kraft Company, Rome Division?

MR. McSWINEY: Mr. Chairman, may I have one minute to arrange these charts?

CHAIRMAN STEIN: Yes. Your presentation will take about how long? About 40 minutes?

MR. McSWINEY: Yes, sir.

CHAIRMAN STEIN: Okay. We will take a few minutes recess.

(A short recess was taken.)

CHAIRMAN STEIN: May we reconvene?

Dr. Venable, did you want to call --

DR. VENABLE: I would like to ask you, if you will, please, to recall Mr. Jack Rodgers, representing Pepperell Manufacturing Company, to explain one little interchange that occurred when he was up before.

CHAIRMAN STEIN: Mr. Rodgers, would you mind coming back?

MR. RODGERS: I made the statement a while ago that we had received a letter from someone. We received an office memorandum from the United States Government, which appears to be a report on a conference, from Mr. John M. Fairall to the record. Subject: Pepperell Manufacturing Company, Lindale, Georgia - Cotton Mill Wastes, Silver Creek tributary to the Etowah and Coosa Rivers. And it's three pages long. I won't read all of it. I will just read the last paragraph, which I seem to have been questioned about. This states in Paragraph No. 18:

"Interstate Pollution -- It is doubtful that this mill is involved in interstate pollution. Samplings at the mouth of Silver Creek, which includes other wastes, should be sufficient in the August 1962 survey."

This is a copy of that memorandum, which I will give you for the record; that is, if you would like to have it.

CHAIRMAN STEIN: Who wrote that?

MR. RODGERS: That, I can't answer you. It's from John M. Fairall.

MR. THOMAN: May I ask you this, sir, was there a cover letter with this?

MR. RODGERS: That, I believe, is all that was received.

MR. THOMAN: Generally in the past, Mr. Fairall has sent a cover letter.

MR. RODGERS: I don't think -- did you mean to say that we made this up?

MR. THOMAN: Oh; no, sir. He sends a cover letter with it in which he asks you to review it, or Pepperell to review it to make sure that it is factually correct.

MR. RODGERS: I believe it was -- I think that was on there. And I think it was factually correct.

MR. THOMAN: All right.

CHAIRMAN STEIN: I think there is a very easy way to do this, and that is a regularized procedure done from time immemorial on this. I don't doubt but that both of you gentlemen are right, but, generally speaking, we let the man who wrote the letter --

MR. RODGERS: I can't hear you.

CHAIRMAN STEIN: Generally speaking, the thing to do is to ask the man who wrote the memorandum to identify it, and he can clear up all questions of whether he wrote it and what he meant. This is one of those internal government memorandums.

Is Mr. Fairall here?

MR. FAIRALL: Yes, sir.

CHAIRMAN STEIN: Would you come up, please?

This is to the record from John M. Fairall, Chemical Engineering Consultant. Are you familiar with this?

MR. FAIRALL: Yes, sir. I have a copy here.

CHAIRMAN STEIN: (Handing copy of document to Mr. Fairall) Do you know that it is the same thing? Why don't you look at it. Do you recognize the memo?

MR. FAIRALL: Yes, sir.

CHAIRMAN STEIN: Did you write the memo?

MR. FAIRALL: Yes, sir.

CHAIRMAN STEIN: Would you want to go to the lectern and explain what you meant?

MR. FAIRALL: In working with industries it has been our practice in our section for a considerable time that, after we interview these industries and find out what information they want to assist us with in these industrial waste surveys, we prepare a memo and we return it to them. Before it really goes into our government files, we return it to the industry to see if they have any corrections to make. Sometimes we accumulate some confidential information, or something of that sort. If they want it removed, this gives them the opportunity.

All these industries that have been considered today, I have had interviews with, and they have worked along this line. This letter that's in question, this office memo, was transmitted on August 13, 1962, with a cover letter, as Mr. Thoman suggests, addressed to Mr. G. Howard Smith, General Manager of Pepperell.

The letter states:

"Enclosed are two copies of our memo on the July 18, 1962 conference. Please review the memo critically, and, if any corrections or additions are desired, mark one copy and return it to us.

"We are also enclosing a copy of 'Industrial Wastes Guide for the Cotton Textile Industry' which should be a source of information in your waste control program and control treatment program.

"Thank you very much for your cooperation in the gathering of information and for showing me through your mill."

This memo, at the time I wrote this cover letter, was in the process of being prepared; and we had asked the industry to cooperate with us in making it a true statement. They never replied to this letter. They never returned it, and, as a result, it is still in process, awaiting their reply. Well, we had it today, evidentally.

As far as the statement is concerned -- this probably again is a bit of advice to our own sampling crew, saying, "It is doubtful if the mill is involved in interstate pollution." It is a single mill and probably not as involved, but yet with other organic wastes discharged to the stream from the vicinity of Rome, Georgia, along with other loads accumulating there, you can no longer separate them and they all become sources of interstate pollution if any of this waste gets on down to the state line, as our survey showed it did.

CHAIRMAN STEIN: Are there any comments or questions?

DR. VENABLE: Yes, sir.

Mr. Fairall, do you work at the Sanitary Engineering Center?

MR. FAIRALL: Yes, sir.

DR. VENABLE: This is a branch of the Public Health Service?

MR. FAIRALL: Yes, sir.

DR. VENABLE: Is it the custom of the Sanitary Engineering Center to furnish state pollution authorities with copies of such memoranda to the industry?

MR. FAIRALL: They are when these memos are complete, through our Regional Office.

MR. THOMAN: And in all cases, sir, I believe that they have been.

MR. FAIRALL: This one is still in process.

MR. THOMAN: This one, as you will note, he mentioned that it was still being processed because the industry had never said that it was correct.

DR. VENABLE: You don't send them to us until after the given industry has agreed on them. Does the Surgeon General know about this custom?

MR. THOMAN: I do not know whether he knows about it personally, sir.

MR. FAIRALL: I was trying to recall this particular situation.

CHAIRMAN STEIN: Pardon me --

DR. VENABLE: Do you personally think this is a way to deal with state authorities?

MR. FAIRALL: Well --

MR. THOMAN: Mr. Fairall, may I answer that question, please?

MR. FAIRALL: All right.

DR. VENABLE: I asked Mr. Fairall, Mr. Thoman.

MR. THOMAN: All right, sir.

MR. FAIRALL: I'll answer it.

We had the permission from the State of Georgia, and I believe we had asked the State of Georgia to participate with us in these interviews -- and they declined.

This memo, which is still in process, is still a part of this interview process.

DR. VENABLE: It was my understanding that the Public Health Service agreed with the State of Georgia in this situation to keep us fully informed of all phases of the study.

MR. FAIRALL: I might be able to find in my file where Thermo-Fax copies, such as Mr. Rodgers exhibited today, at the time they were distributed, occasionally we send Thermo-Fax copies to the Region, with the idea that they can transmit these Thermo-Fax copies on to the state. Now it will take a little search of our files to find out whether it was done in this particular case. It might have been.

DR. VENABLE: Whether it was done in this case or not, do you think it ought to be?

MR. FAIRALL: I don't think so. I mean, this is still -- we are trying to sum up with the industry an interview we had with them as to the correctness of the statement, and I see nothing wrong with completing the tabulation of this information, such as we do -- and this one is incomplete.

DR. VENABLE: It could not have been made more complete by consultation with the state?

MR. FAIRALL: We had asked the state to consult with us in these interviews.

DR. VENABLE: And the state was told you would keep us fully informed at all stages? I honor your judgment. I just want to know what it is.

MR. FAIRALL: Whether we kept you informed or not?

DR. VENABLE: Whether you think you should have at all stages, such as a copy of the memo that has just been presented.

MR. FAIRALL: Generally, these memos go out and come back within a week's time.

CHAIRMAN STEIN: I think I can state the policy of the service, and I've been around for twenty-two years. I don't think we correspond with any city or municipality in the state, draft or otherwise, without sending a copy to the state agency; and this is a fairly rigid rule we have, as you know, Doctor, and is based on experience through the years.

This question sometimes arises from time to time. Either sometimes there is a slip-up and the state doesn't get something when they should get something, and this has happened to me when the secretary inadvertently didn't put a carbon on the bottom when she should have--and I've been in hot water. Or in a situation where someone might think, as Mr. Fairall has indicated, that he was just completing an interview. I think I know the Surgeon General's attitude on this, the Bureau Chief, and the Division Chief, and all the people. I think we have leaned over backwards in sending this to the states. I think that if this has not been done, it should have been done.

MR. THOMAN: May I answer that? It was done, because I personally remember seeing a lot of these come through my office to Mr. Trombetta for subsequent forwarding to the State of Georgia. Now whether this particular one in the uncompleted form was ever sent or not, I am not prepared to testify yea or nay. We can certainly check our records when we get back to Atlanta and advise you, if you would like to be advised, as to whether or not it was ever sent.

DR. VENABLE: Mr. Thoman, errors don't bother me. All of us make them. But Mr. Fairall just told me, he didn't think the state ought to be informed on this, and this was the point that I was very much interested in. I got my answer and I'm perfectly happy.

CHAIRMAN STEIN: I also think, Doctor, that the policy of the Public Health Service and the Department is abundantly clear. The policy is that the states are interested and do keep informed, and for this I am going to go off the record one second, and then we will go on the record.

(Discussion off the record.)

CHAIRMAN STEIN: On the record.

Thank you, Mr. Fairall.

May we have the Rome Kraft now?

MR. McSWINEY: Mr. Chairman, conferees, ladies and gentlemen: My name is E. V. McSwiney and I am Vice President of Georgia Kraft Company, formerly Rome Kraft Company, which is jointly owned by Inland Container Corporation of Indianapolis, Indiana and the Mead Corporation of Dayton, Ohio.

I want to thank you for this opportunity to present the Rome story for the Georgia Kraft Company.

As you can imagine, since water is the most vital resource in paper making, we at Georgia Kraft have had a real interest in the condition of the Coosa River, beginning before the mill was even constructed.

Since operations began in 1954 the river has been surveyed at frequent intervals as a standard procedure. Our technical staff has continually sampled and tested the river. We have installed waste control facilities in keeping with our growth and changing conditions of the Coosa River, and we have had excellent relations with the Alabama Water Improvement Commission and the Georgia Department of Public Health.

The Rome mill, which was built in 1954 and expanded in 1961, has a present capacity of 1400 tons of kraft container-board per day. The Rome mill is a significant economic factor in the Georgia-Alabama area, employing some 900 people, with an annual payroll of more than $6,400,000. Of this total payroll approximately $250,000 is paid to those employees who are residents of Alabama. In addition, $3,000,000 is paid annually to dealers and producers from Floyd County and neighboring Georgia and Alabama counties for pulpwood. Of this roughly $1,200,000 is produced in Cherokee, DeKalb and Etowah Counties in Alabama. In Cherokee County, Alabama alone more than $11,000 is paid each week for pulpwood.

To make our technical presentation I would like to introduce Mr. Virgil A. Minch, a water resources specialist, who has gained a highly respected reputation in this field. Mr. Minch is Associate Director of Technical Service for the Mead Corporation in Chillicothe, Ohio. His corporate responsibility is to provide the Mead Division and affiliates with technical advice and assistance in the broad field of water resources. He is well-qualified for this assignment, having earned his master's degree in Sanitary Engineering at the Massachusetts Institute of Technology, after which he served in the United States Public Health Service as Senior Assistant Sanitary Engineer for four years before joining Mead in August of 1953. Additionally, he contributes to the effectiveness of numerous water and stream improvement groups. He is Vice President and Director of the Scioto Conservative District, a five-county water management district in Ohio. He serves as Regional Chairman for the National Council for Stream Improvement, the only industry-sponsored organization in the country whose force is solely directed to the improvement of our streams, and he is active in numerous other similar organizations and associations.

He is well-qualified to speak with authority on water resources, its use and conservation.

Mr. Minch.

MR. MINCH: Thank you, Mr. McSwiney.

Mr. Chairman: Rome Kraft Mill is located at Krannert, Georgia on the Coosa River at river mile 268.65, approximately 15 river miles below Rome, Georgia, and 16 river miles above the Georgia-Alabama state line.

Let me point this out on this chart. The Rome mill is located mid-point approximately between the City of Rome, Georgia and the Alabama-Georgia state line.

The Coosa River is formed by the junction of the Etowah River and the Oostanaula River at Rome, where it flows in a southwesterly direction, crossing the Alabama-Georgia state line, following a meandering course through the State of Alabama to its mouth, where it joins the Tallapoosa River near Wetumpka, Alabama, to form the Alabama River.

The Weiss Dam near Leesburg, Alabama, approximately 45 miles below the Rome Kraft mill, was completed in 1961, and is operated by Alabama Power Company for run-of-the-river generating under computer control. The dam backs water to an elevation of about 564 feet above sea level, and has changed the character of the Coosa River at the Rome Kraft mill from a fast-flowing, shallow stream to a lake.

From the Rome Kraft mill to Poole's Ferry, approximately five miles within the State of Alabama, the Coosa River, as now impounded by Weiss Dam, follows a meandering course generally within its boundaries. From Poole's Ferry to Cedar Bluff there are increasing embayments, with recent developments of summer cottages in the lower lake. The major area for recreation is in this lower Lake Weiss at, near and below Cedar Bluff.

Another significant physical factor affecting the river is the Allatoona Dam located approximately 48 miles upstream on the Etowah River. It was built by the Corps of Engineers for the generation of peaking power, and was closed in 1951. Allatoona's operation caused wide diurnal variations in the flow rate as far downstream as the Rome Kraft mill. The effect of these variations will be discussed in greater detail a little later.

In 1947, when Rome Kraft decided to construct a 600-ton containerboard mill, the Rome, Georgia site was one of several considered. Rome Kraft was keenly aware that both an adequate water supply and an adequate river flow to assimilate mill wastes was important to the successful operation of such a mill.

It is important to note that the industrial wastes from a kraft containerboard mill do not contain pathogenic bacteria, toxic substances or other materials harmful to human health. These wastes, unlike domestic sewage, do not contaminate the river and cannot cause typhoid fever, hepatitis, or any of the other diseases caused by raw sewage. Essentially, a kraft containerboard mill's industrial effluent comes from the wood used in the manufacturing process and consists of wood lignin, simple wood sugars, and other similar materials which are diluted in large amounts of water.

The measurement of such industrial wastes, in terms of population equivalent, referred to here as P.E., incorrectly implies that such wastes are the same as raw sewage. Since the only substantial effect of such wastes on the river is in the utilization of dissolved oxygen, it is more appropriate to express the Rome Kraft waste load in terms of the 5-day biochemical oxygen demand, known as B.O.D., and that basis of measurements is therefore used throughout this statement.

Incidentally, the population equivalent, or P.E., is nothing more than six times the B.O.D. figure.

Extensive studies were made for Rome Kraft to determine the assimilative capacity of the Coosa River at the proposed mill site. After favorable preliminary reports by Doctor Dunbar G. Terry, of the Mead Corporate Technical Service, Professor C. J. Velz, of the University of Michigan's School of Public Health, was engaged to make a full-scale technical evaluation of the river's assimilative ability. This report, prepared in August 1951, was based on a mill producing 34 pounds of B.O.D. per ton of production at a 600 tons daily production level, or 20,400 pounds of B.O.D. per day. To project the effect of such a mill, Professor Velz used three flow levels of the Coosa River; 800 cubic feet per second, which is a severe drought flow under unregulated conditions; 1,000 cfs, which is the once-in-five-years minimum daily average flow; and 2,000 cfs, a moderate low-level flow. Professor Velz determined that, with 20,400 pounds of B.O.D. at 30° C and an 800 cfs flow, the maximum depletion in the oxygen would be to a level of 5.0 ppm. At the same temperature and loading conditions, the 1,000 cfs flow would result in a minimum dissolved oxygen concentration of 5.3 ppm, and the 2,000 cfs flow would produce a minimum of 5.9 ppm.

In addition to these projections, Professor Velz also developed data on somewhat higher loads. Using a loading of 49 pounds of B.O.D. per ton of production and at the same proposed 600 ton daily production level, or 29,500 pounds of B.O.D.per day, Professor Velz calculated that only about 1,000 cfs of flow were needed to maintain a minimum dissolved oxygen level of 4.5 ppm in the free flowing river. It is significant that the figure of 29,500 pounds, as projected by Professor Velz, is very close to that which was produced by the mill at full production in its first years of operation.

The Velz report, therefore, provided an excellent basis for the technical decision that the mill could be operated at the Rome site without any adverse effects on the Coosa River.

It is obvious, of course, that the discharge of mill wastes into the Coosa River would decrease the dissolved oxygen content of the river that existed prior to the construction of the mill. However, the 4.5 ppm of dissolved oxygen predicted by the Velz report provided an ample margin of safety above acceptable standards for river dissolved oxygen. This is particularly true when it is realized that, at the time of the Velz report, 1951, 3.0 ppm of dissolved oxygen were generally considered adequate for the protection of river biota. The Public Health Service report indicates that the water quality at the Georgia-Alabama state line has been progressively degraded. The data for the 1955 average dissolved oxygen and the 1957 average dissolved oxygen shown in its Figure 9 was obtained, respectively, from September 6 through September 10, 1955 (four days), and from August 12 through August 23, 1957 (eleven days). During these two months (60 days), Rome Kraft obtained daily data on the river, and this data more accurately reflects the average dissolved oxygen during each of these months and establishes that the dissolved oxygen levels during such months were safely above the standards set by the Alabama Water Improvement Commission. Indeed, from this chart it may be seen that the Rome Kraft effluent B.O.D. in the low flow months, August and September, 1955 through 1958, prior to the Weiss impoundment, when related to a river flow in feet per second, actually have decreased in the years 1955 through 1960.

Although the flow projections for the Velz report were made on the basis of data collected prior to the closing of Allatoona Dam, these levels are, in fact, close to those which were encountered at the mill until the closing of Weiss Dam.

During the years 1954 through 1960, production at the Rome Kraft mill was in the range of 600 to 800 tons per day, and caused no adverse effect on the river. River data collected during this period established that the Velz projections were reasonably correct. Such data disclosed that, in the stretch of river which coincides with the low part of Rome Kraft's dissolved oxygen "sag" curve; that is, from five miles within the State of Georgia to five miles within the State of Alabama, the dissolved oxygen consistently exceeded 4 ppm.

In those years 1954 through 1960, pre-impoundment years, 812 samples were taken by the mill's technical staff. 316 of these samples were taken in this ten-mile stretch just mentioned; that is, five miles above the line and five miles below the line, and of these 93.4% contained 4.0 ppm or more of dissolved oxygen, and 79.5% contained 5.0 ppm or more of dissolved oxygen. A failure in the Rome Kraft lagoon dike was responsible for approximately 30% of the samples below 4.0 ppm. It is significant, also, that a majority of these 812 samples were taken during those months in which river conditions are normally critical; that is, August and September of each year.

In 1955 consideration was given to expansion of the mill to double its capacity. In connection with these plans, a further study of the river was undertaken by Fred Schott and me, both of the Air and Stream Pollution Control Group of the Mead Research Department. As a basis for this report it was possible to use data gathered under actual mill operating conditions.

The survey was conducted from mid-June to early November, 1955. During this period the river flow ranged from 870 cfs to 2840 cfs, production at the mill averaged 700 tons per day, and the B.O.D. load to the river averaged 28,240 pounds per day, or 40.3 pounds per ton of production.

During the 1955 survey, the B.O.D. load from the mill actually ranged from 13,000 pounds to 45,000 pounds, except on one day when it was 65,000 pounds. It is interesting to note that the fast-flowing river was able to assimilate the 65,000 pound load at that time without reducing the dissolved oxygen level below 5.7 ppm.

Analysis of the flow data available at the time, which consisted of the five years of record since Allatoona Dam had been closed, showed that the minimum daily average was more than 870 cfs all of the time, in excess of 1370 cfs 95% of the time, and over 1820 cfs 90% of the time. River temperature during the survey ranged from 20° to 25° C, but, for calculating purposes and just to be on the safe side, 27° to 29° C was used.

For the purpose of establishing the maximum load which could be safely assimilated by the river, 1820 cfs, which is this minimum daily average to be expected 90% of the time, was taken as the basic flow rate. With this flow and a temperature of 27° C, it was concluded that 4.0 ppm or more dissolved oxygen could be maintained without treatment at 1200 tons daily production, and this would impose a load on the river of no more than 48,400 pounds of B.O.D. per day.

At about this time it was learned that the Alabama Power Company was planning the construction of Weiss Dam, which would be closed concurrently with the completion of the Rome Kraft expansion. At a meeting in February, 1956, attended by representatives of Alabama Power Company, Rome Kraft, the Georgia Department of Public Health, and the Alabama Water Improvement Commission, the effect which the impoundment would have on the assimilative capacity of the river was fully discussed. All of the parties, except Alabama Power, agreed that a reduction in the assimilative capacity of the river would result from the impoundment. It is significant that none of the parties was able to establish precisely the extent of this reduction or the level of waste load which the impoundment could assimilate.

Therefore, based on the best estimates available, the Georgia regulatory officials required that the waste load to the stream not be increased. This meant that treatment facilities for a 50% reduction of a B.O.D. load from the doubled capacity would have to be installed. The Alabama authorities continued their minimum requirement of 4.0 ppm of dissolved oxygen at the Georgia-Alabama state line.

Pilot plant studies to determine the type of treatment which would best provide the 50% removal required by the Georgia authorities were carried out over a considerable period of time, both here at Rome and at the Mead Research Laboratories at Chillicothe, Ohio. Dr. Clair N. Sawyer, of Metcalf and Eddy, consulting engineers, of Boston, Massachusetts, reviewed and approved both the manner in which the pilot plant studies were conducted and the process design for the treatment plant. This work formed the basis for the design of the original treatment plant at Rome Kraft, which was built at a cost of $1,300,000, and included a trickling filter incorporating for the first time a new plastic filter media.

The treatment plant is designed to remove 28,000 pounds of B.O.D. from a load of 56,000 pounds per day in a flow of 16 million gallons per day. The design loading of the filter is 3.2 million gallons per thousand square feet per day and 560 pounds of B.O.D. per thousand cubic feet of media. The tower contains 100,000 cubic feet of polyvinyl chloride trickling filter media developed by the Research Department of The Mead Corporation and manufactured for us by the B. F. Goodrich Company, and you may recall seeing a picture of the filter and the filter media in a Goodrich advertisement in Time Magazine in March, 1962.

This 100,000 cubic feet of trickling filter media has a packing surface of 3,700,000 square feet, and it is the equivalent of a rock filter six feet deep covering an area of 100,000 square feet, or approximately 2.3 acres.

Here is how the system installed in 1961 worked (referring to Exhibit 3 of Rome Kraft's printed report):

Mill wastes are blended in a surge tank to even out both the quantity and the quality, and from there it is sprayed to the surface of a trickling filter 80 feet in diameter and 30 feet high, from here to a clarifier to settle off the solids. Retention time in the clarifier is approximately two hours. The diameter is 160 feet and it is 11 feet deep. From here the wastes go to an aeration tank of 1 million-gallon capacity, where the effluence is sprayed into the air at a rate of 15,000 gallons per minute. The retention time in this tank is one hour, 20 minutes. It is 92 feet in diameter and 22 feet deep. From here, to a series of five lagoons, 4 feet deep, having a surface area of 21.6 acres. As the waste tumbles from one lagoon to another, they go over cascade aerators to introduce more atmospheric oxygen. From the lagoons to the river through a 36-inch line, where it is discharged into the Coosa River in a submerged diffuser.

Since its start-up, the treatment plant has consistently removed 28,000 pounds of B.O.D. per day, except during the winter months; and it is common with all trickling filters, including our own, that it does lose some efficiency during periods of cold weather. Such loss of efficiency, however, is not significant, since river conditions are not critical during the winter months. However, because of increased loadings to the treatment plant resulting from the mill expansion, the B.O.D. load to the river has at times exceeded the standard of 28,000 pounds per day set by the Georgia regulatory authorities. This situation has been alleviated to some extent by improved treatment plant operating techniques resulting from two years of experience, especially in the area of sludge disposal and by the installation of a skimming system in the clarifier.

It is unfortunate that the improved technique for the disposal of settled sludge was not in use in August, 1962, when the Public Health Service survey was being conducted. If this equipment had been operating during this period, the downstream dissolved oxygen would have been higher.

To satisfy its obligation to maintain stream loadings at the level existing prior to the mill expansion, the management of Rome Kraft is now spending $2,500,000 for addition to the treatment plant, including a 225-foot diameter primary clarifier, sludge disposal facilities, and other substantial modifications in the mill. Construction of the clarifier has been completed and was placed in operation last Thursday. It is anticipated that the mill modifications will be completed early in the spring of 1964.

The data collected to date from the time of the closing of Weiss Dam and the concurrent start-up of the addition to the mill has shown that good oxygen conditions can be maintained when an adequate flow of water reaches the mill. However, survey data collected during the low-flow periods in both 1961 and 1962 indicate that the river is now not able to assimilate the normal mill loads applied during such critical periods.

Rome Kraft records also show that during low-flow periods there have been occasions when the dissolved oxygen of the river water coming to the mill has dropped to 4.0 ppm or less.

The closing of the Weiss Dam has significantly changed the character of the Coosa River all the way from the day to Mayo's Bar above the Rome Kraft mill. Instead of a shallow, fast-flowing stream, the Coosa River is now a deep, slow-moving lake.

Prior to the impoundment, the Rome Kraft effluent was easily assimilated by the river, and the cyclic flow from Allatoona Dam had no significant effect.

Subsequent to the Public Health Survey and when Rome Kraft fully began to appreciate the substantial reduction in the assimilative capacity of the Coosa River, Dr. Peter A. Krenkel, head of the Graduate School of Sanitary Engineering at Vanderbilt University, a stream assimilative specialist and consultant, was retained by Rome Kraft to make a new and thorough study of the river under the existing impoundment conditions.

In his report, Dr. Krenkel points out how extensive the loss of assimilative capacity has been. Although prior to the closing of Weiss Dam, the river, as shown by the Minch-Schott report, could assimilate 48,000 pounds of B.O.D. per day at the minimum daily average flow of 1820 cfs, which could be expected 90% of the time, Dr. Krenkel has found that the impoundment can now assimilate only 10,000 pounds of B.O.D. per day under substantially the same conditions. This means that there has been a loss of approximately 80% in the river's assimilative capacity. Dr. Krenkel attributes this loss to a combination of the factors of increase in depth and temperature and of reduction in velocity. The increase in depth and the reduction in velocity have substantially reduced the aeration which took place in the free-flowing river, and have also permitted surface thermal stratification, which further reduces assimilative ability.

This loss in assimilative capacity can be illustrated very graphically by this chart (Referring to Exhibit 9 of the printed report.):

In 1951 prior to the construction of the Rome Kraft mill, the Velz report indicated that 29,500 pounds of B.O.D. could be safely discharged to the Coosa River, and that there would be some safe reserve.

In 1955 the Minch & Schott Report, using data collected under actual operating conditions, you will note that 28,240 pounds of B.O.D. were actually being discharged into the river, and the safe reserve was calculated so that the total safe B.O.D. load that could be safely discharged was determined to be 48,400 pounds of B.O.D.

In 1961, prior to the construction of Weiss Dam and when the experts could not predict what the exact effect would be, it was estimated that the same 28,000 pounds of B.O.D. could be safely discharged to the stream, and this would be the result of a 50% treatment of the mill effluent of 56,000 pounds which would be the load at expanded production level.

In 1963 Professor Krenkel's report shows that the actual assimilative capacity of the stream is only 10,000 pounds of B.O.D. per day. This means that in the time from the impoundment of the Coosa River by Weiss Dam until today and as a result of the impoundment of the Coosa River, there has been a loss of 80% of the assimilative capacity of the stream.

As I have previously mentioned, the present river situation is affected by the fluctuating flow pattern produced in the river by the peaking power operation of Allatoona Dam.

Incidentally, it is interesting to note from Table 3 of the Public Health Service report the reference made to the substantial adverse effect of the Allatoona Dam on the eight-mile stretch of the river below the dam discharge. Although a small house generator producing a flow of 202 cfs is continuously operated, the significant flows from Allatoona Dam come when generation for peaking power is in progress. This occurs from Monday through Friday and usually only 4 to 8 hours out of each 24. The effect of this cyclic flow pattern is now easily detectable at the Mayo's Bar gauge.

From this chart (referring to Exhibit 6 in the printed report), which is a hydrograph of the flow at Mayo's Bar from September 20 to 26, 1962, a typical week, it can be seen that the river flow will vary all the way from 1000 feet per second (cfs) up to 3000 and has a daily 24-hour cycle, which is the exact cycle because of the generating of power at Allatoona Dam, but most significant is the low flow which reaches Rome sometime Saturday night and continues all the way through Monday night. This same effect is felt at our mill gauge, approximately one hour later.

In this regard, Figure 13 of the Public Health Service report fails to show the effect of this continuous weekend low flow from Allatoona Dam. In addition, if more extensive data had been obtained, Figure 13 would have disclosed minimum diurnal low flows to be 800 cfs, rather than in the range from 1,000 to 2,000 cfs, as reported.

Prior to the closing of Weiss Dam, the cyclic flow from Allatoona had been dampened by the time it reached the mill and did not substantially affect mill operations. Now, when the surge of water from the Allatoona peaking operations reaches Mayo's Bar, it spills over into the backwater of the lake behind Weiss Dam. Rather than being dissipated, as it did before the dam was constructed, the cyclic flow nature now continues all the way through the embayment as far down as Poole's Ferry.

On days when the river flow, before impoundment, averaged 4,000 cfs, the minimum flow would be somewhere around 3600 cfs and the maximum 4400 cfs. Now, after impoundment, because of this dampening effect the same average flow of 4,000 cfs, the minimum is now 1800 cfs, approximately one-half of the minimum flow that occurred prior to the closing of the dam, and the maximum flow is slightly higher. Obviously the average flow is adequate, but the low extremes present problems because there is less dilution and waste assimilation is reduced when the flow past the mill changes continually.

Since the closing of Weiss Dam, there has been a sharp reduction of the assimilative capacity in the impoundment.

Let me repeat. The average flow past the mill has not changed since Weiss Dam was closed. However, the river velocity at the mill now much more directly reflects the cyclic flow from Allatoona and results in higher maximum flows and lower minimum flows at the mill, consequently reducing, particularly during the Sunday and Monday periods, the assimilative capacity of the river at Rome Kraft.

This curve shows the typical oxygen "sag" curve before and after impoundment (referring to Exhibit 5). It clocks river miles below Rome, Georgia against dissolved oxygen concentration. The noraml curve before impoundment was one that you might expect, reaching a low level of perhaps 5.0 ppm on an average and recovering on downstream.

Now, after impoundment, we have a much deeper and a much steeper oxygen "sag" curve, with a multiple head effect, and the low level now reaches 3.0 ppm. This multiple effect is the result of this cyclic flow which now carries down into Lake Weiss.

In addition, the peaking flow past the mill outfall makes it difficult to obtain maximum dilution of the effluent. Normally, the mill effluent is discharged at a constant rate. However, a constant rate discharge into a varying rate of flow results in a rate of dilution which varies with the flow pattern. This situation further aggravates the problem in the river below the mill by causing depletions of oxygen to levels below that which would result if average dilution could be obtained.

In the spring of 1962, a valve was installed in the discharge line from the last lagoon at the Rome Kraft mill to the river and is now used to cycle the effluent discharge in accordance with the cyclic river flow at the discharge point. Because of the lack of adequate head from the last lagoon, however, it was not possible to discharge effluent at a rate adequate to take advantage of the flow at the peak of the river cycle. This situation has now been rectified this summer by the installation of a 22,000-gallon-per-minute pump.

The U. S. Army Corps of Engineers is presently undertaking the construction of Carter's Dam on a tributary of the Oostanaula River, approximately 74 miles above Rome, Georgia. This dam will also be operated as a peaking power dam and could further change the characteristics of the Coosa River by aggravating the adverse effect of the cyclic flow at the Rome Kraft mill, particularly the weekend flow. Rome Kraft is deeply concerned about this new development and strongly urges that appropriate steps be taken by the proper agencies to so regulate the flow from Carter's Dam so that it will lessen rather than increase the cyclic flow in the Weiss impoundment at the Rome Kraft mill.

Let me illustrate. The hydrograph of the Coosa River at the Rome gauge, present flow conditions being in yellow. This is similar to the one that I just showed, having the cyclic nature and occurring late Saturday to late Monday.

CHAIRMAN STEIN: Mr. Minch, are you going to put those charts in for the record?

MR. MINCH: Yes, sir.

CHAIRMAN STEIN: I think you should refer to each chart by title. I think you have tried to up to now, but you have been mentioning color. The problem is, we are going to have a reproduction on black and white.

MR. MINCH: They are in the state, which I will submit for the record in black and white.

CHAIRMAN STEIN: But in talking about the charts, you see, you said, "the yellow line, and the red line." Now just visualize this, when someone reads your report later.

MR. MINCH: I see; all right.

CHAIRMAN STEIN: Thank you.

MR. MINCH: The present hydrograph of the Coosa River flow at Rome, Georgia, takes the low flow pattern that I previously explained, reaching a low flow on Saturday, late Saturday, and continuing until late Monday. The projected flow pattern from Carter's Dam is also a peaking power type curve, having a cyclic nature, and again reaching the Rome gauge late Saturday and continuing through Monday. Now the combination of these two could result in this curve, which is a combination of the two, again having the low flow on Saturday through Monday at the Rome gauge and now being approximately one-half of that which is now being experienced.

In conclusion, allow me to summarize. Rome Kraft operated its mill on the Coosa River from 1954 to 1961 without adverse effect on the river and in compliance with the requirements of the regulatory agencies of both Georgia and Alabama. During this period, production averaged 700 tons per day and the daily B.O.D. load on the shallow, fast-flowing river was approximately 28,000 pounds.

The Velz report, prepared prior to construction of the mill, predicted that this load, involving no treatment, could be assimilated by the river with some safe reserve. The Minch-Schott report in 1955 confirmed Professor Velz's projections, and, on the basis of available operating data, concluded that the river could safely assimilate a B.O.D. load of 48,000 pounds per day.

When Rome Kraft determined to double its productive capacity, it obtained the best technical advice available and, at a cost of $1,300,000, installed a waste treatment plant of the latest design. To maintain the waste load to the river at the same level as existed prior to the mill expansion, Rome Kraft has made continuing improvements to its waste treatment plant, and, based on operating experience over the last two years, is now spending $2,500,000 for additional equipment for this purpose.

However, Weiss Dam, built by Alabama Power Company for its own economic benefit, has changed the Coosa River at the Rome Kraft mill from a fast-flowing shallow stream to a lake.

It has been conclusively established that impoundment, involving reduction in velocity and increase in depth, substantially reduces the assimilative capacity of a river. Using data obtained during the fall of 1962, Dr. Krenkel has calculated that during the low-flow periods of the river, as impounded by the Weiss Dam, it can now only assimilate 10,000 pounds of B.O.D. per day, a reduction of approximately 80% of its assimilative ability.

This reduction in assimilative capacity is equivalent to a major source of pollution in the Coosa River. It is, therefore, the impoundment by Alabama Power Company of the waters behind the Weiss Dam and not additional burden to the river caused by the effluent from Rome Kraft which has substantially reduced the dissolved oxygen quality of the Coosa River at the Alabama-Georgia state line.

Again, it should be noted that the Rome Kraft industrial wastes are not harmful to human health, nor do the wastes appreciably contribute to the color problem in the river.

It has long been recognized that this country's rivers can and should serve a multitude of purposes. As the Public Health Service report points out, they are, of course, used for municipal, agricultural and industrial water supplies, for fishing, boating, swimming, and other recreational activities, for transportation, and for generation of power. No one can dispute the importance of adequately protecting our waters for these important purposes. Nevertheless, this country cannot affort to lose sight of the fact that our waters also serve a vital function in receiving and purifying municipal and industrial effluents.

Rome Kraft recognizes that industry must continue to do its part in the protection of our waters. The welfare of the Rome area, however, is bound up with the economic well-being of its industries. If any industry is called upon to contribute an undue proportion of the cost of stream improvement so that other water users may, without contribution to the cost, enjoy economic and other benefits, the economic welfare of the entire community could suffer.

As this statement evidences, Rome Kraft has continuously, from the original planning for its mill, been keenly aware of its responsibilities in the area of water pollution control. It has spent substantial amounts of money for the installation and operation of its treatment plant. It has pioneered in the development of a new type of trickling filter. It has fully cooperated with the regulatory agencies and the Public Health Service in the monitoring and surveying of the river. It is now spending another large amount of money to further reduce the waste load to the stream.

Rome Kraft sincerely believes that, with the completion of the improvements now under way, it will have done its full share in the protection of the Coosa River. As with any industry, there are limits to the moneys available for treatment plant facilities. Rome Kraft, its employees, and the Rome community clearly understand that if an undue proportion of the responsibility for correcting the present river condition caused by the Weiss impoundment is assigned to Rome Kraft, it may have no alternative than to reduce production with its attendant reduction in employment and income in this Georgia-Alabama area.

The waters of the Coosa River and the Weiss impoundment can and should satisfy the needs of both recreational and industrial waste assimilation users.

The water quality in the lower part of Lake Weiss is now better than the Coosa River water quality in this area prior to the impoundment. This portion of Lake Weiss, from the Cedar Bluff area to the Weiss Dam, constitutes more than 84% of the total area of the impoundment.

The reach of Lake Weiss from Poole's Ferry, past the Alabama-Georgia state line, up to the Rome Kraft Mill constitutes less than 6% of the impoundment. It is located substantially within its boundaries and travels through relatively uninhabited country, and is not now used or needed for recreational activities, as these aerial photographs clearly indicate. From the Rome Kraft Mill all the way down to Poole's Ferry it is relatively uninhabited country.

CHAIRMAN STEIN: Are you going to present those photographs to us for the record?

MR. MINCH: Yes, sir.

CHAIRMAN STEIN: I don't know whether we will reproduce the photographs. We will keep them in the files. The question on production of photographs will depend on costs, and sometimes the reproduction of photographs costs as much as the rest of the transcript. If this is the case, we may have a problem.

MR. MINCH: This stretch of river has been used, and should continue to be used, for the legitimate water use purpose of assimilation of industrial wastes.

It should be noted that Rome Kraft takes exception to conclusion E (1) of the Public Health Service Report. Rome Kraft's industrial wastes are obviously not endangering the health of persons in Alabama or in Georgia, and Rome Kraft firmly believes that the record shows that its wastes are not endangering the welfare of persons in either state.

The need for recreational water has been satisfied by the large area in the lower part of Lake Weiss, and this has resulted in a loss of 80% of the assimilative capacity in the upper reach of the lake. To require that water quality in this stretch of the river; that is, from Poole's Ferry back to the Rome Kraft mill, be maintained at recreational standards would result in Rome Kraft's bearing the cost of water recreation in this now unused, relatively small area of the river. Any additional recreational benefit to the community would be greatly outweighed by the loss in employment and income in this Georgia-Alabama area, and this would inevitably result. To maintain such water quality, Rome Kraft would have no alternative than to substantially decrease its production, its employment, and its pulpwood purchases.

It is, therefore, respectfully submitted that this conference make the following findings:

1. The Weiss impoundment has reduced the assimilative capacity of the upper reach of the Coosa River from Poole's Ferry to the Rome Kraft mill approximately 80 per cent.

2. Such reduction of assimilative capacity is equivalent to a major source of pollution in the Coosa River.

3. The upper reach of the Coosa River from Poole's Ferry to the Rome Kraft mill should be considered an industrial waste stream.

4. The industrial wastes of the Rome Kraft mill do not endanger the health of persons either in Alabama or Georgia.

5. The ruling of the Georgia State Health Department that Rome Kraft be permitted to discharge into the Coosa River a B.O.D. load of 28,000 pounds per day is reasonable, and such discharge will not endanger the welfare of persons either in Alabama or Georgia.

6. The Federal Government should require that the operation of Allatoona Dam be adjusted to augment the flow in the Coosa River during low-flow periods so as to provide a minimum flow of 1800 cfs at Mayo's Bar.

7. The Federal Government should also require that the operation of Weiss Dam be coordinated with Allatoona Dam's adjusted operation to assure that, during low-flow periods, such minimum flow at Mayo's Bar is concurrently passed through the Weiss impoundment.

8. In addition, the Federal Government should require that the governmental agencies responsible for Carters Dam regulate and coordinate its operation to assure that the foregoing minimum flow be maintained at Mayo's Bar, and that the cyclic flow from Carters Dam complement, rather than aggravate, the cyclic flow from Allatoona Dam.

9. Since the responsibility for the Weiss impoundment and the resultant loss of assimilative capacity of the Coosa River does not rest with Rome Kraft, Rome Kraft should not bear the sole responsibility for maintaining a fixed dissolved oxygen standard at the Georgia-Alabama state line.

Thank you, Mr. Chairman. I have to submit for the record a copy of this statement.

CHAIRMAN STEIN: Thank you, Mr. Minch, for a very excellent and thorough report. The more we meet at these conferences -- and I hope this won't get you in trouble with your management -- but the reports of our Department and yours are getting to be more and more alike. We may be able to retire our staffs. That was a very good report.

Do we have any questions from Alabama?

DR. MYERS: I have a comment. I want to commend this presentation for its clarity, for its content, and for many of the explanations which have been expressed. I would reserve for a later time to comment on some of the conclusions which are requested, but I think that the amount of work that has gone into this and the nature in which it has been presented is certainly most commendable, and certainly this industry should be commended for its efforts in solving its share of the pollution problem.

CHAIRMAN STEIN: Thank you.

Do you have any comments, Dr. Venable?

DR. VENABLE: No.

CHAIRMAN STEIN: Mr. Thoman?

MR. THOMAN: Mr. Minch, I've got two or three questions. One of them is, after all of the modifications, waste treatment, et cetera, that you are spending $2,500,000 on, how many pounds of B.O.D. per day will you be discharging into the river?

MR. MINCH: Jack, I don't know. We've had not enough experience really with our new clarifier to tell what it's going to do.

MR. THOMAN: Do you think you would get anywhere near the 10,000 pounds.

MR. MINCH: No, sir.

MR. THOMAN: Well, will it be 25,000 or 20,000?

MR. MINCH: Our objectives have been 28,000 pounds, and anything better than that, of course, is going to help us. How much this will be, I cannot tell you sir.

MR. THOMAN: The next question is, what effect on the river does Plant Hammond of the Georgia Power Company have on the temperature rise?

MR. MINCH: I can't tell you that, either, Jack. We have a study that was undertaken partially last year and it's continuing this year in cooperation with them. As you know, we have been having a relatively good water year and the water flows have not allowed us to determine with any accuracy what this rise will be. The study is still continuing, but it is not complete.

MR. THOMAN: Would it be correct in assuming possibly that this Plant Hammond below you -- or is it above you on the river?

MR. MINCH: Yes, just a short distance below.

MR. THOMAN: That's below you.

MR. MINCH: Actually, our discharge crosses over and is discharged below their intake. So we are neighbors.

MR. THOMAN: Do you feel that this temperature rise coming out of Plant Hammond would have any effect of the reaeration capacity of the stream?

MR. MINCH: Any temperature rise would.

DR. MYERS: Isn't it possible that some of the figures which you have shown and attributed to the Weiss impoundment might be, in part, explained by the addition of the temperature change caused by this Hammond Plant?

MR. MINCH: It's possible, and I want to qualify it. I can't give you a definite answer, but this is very definitely possible.

MR. THOMAN: Isn't it conceivable -- I don't know what the history of Plant Hammond has been or what it is going to be -- but Georgia Power recently doubled its rather large plant around Atlanta, and, if the projected demands for electrical energy coming within the next 40 to 50 years, conceivably they could expand this one and just ultimately keep compounding this problem?

MR. MINCH: We have someone here from the power company, if you want to ask him a question.

MR. THOMAN: No. I was just speculating on the subject.

CHAIRMAN STEIN: No. I don't know that we do that.

As far as I can see this, you people have -- and I think this should be noted -- have done a good job and made a reasonable effort to meet the problem. I find myself, as a Government man, in a peculiar position of trying to defend Alabama Power and Georgia Power against some of the catch phrases in the report. You say that the Weiss impoundment was built solely for the profit of Alabama Power. This might be, but this is what motivates this country. This is what I suspect might motivate your company, too.

MR. MINCH: You are correct.

CHAIRMAN STEIN: But I always have to expect that in a society like ours that some fellow is going to move in downstream or upstream, and do it for profit. That's why they do things here, and, when they do, we have different conditions.

Now admittedly you do have a difficult problem. You've made a real hard effort to get at the problem. I think you have achieved very good results, but the question we seem to have here is the combination river flow problem and discharge problem in changing the regiment of the stream. And this isn't just peculiar here. As more and more of our streams become regulated instead of free-flowing streams, we are going to have this all over the country; and, within the next fifty years, you are not going to find a free-flowing stream any more of any size in this country. This is something --

MR. MINCH: I hope that's not true.

CHAIRMAN STEIN: You don't agree?

MR. MINCH: I hope that's not true.

CHAIRMAN STEIN: Well, you see all the dams they are authorizing every year. Just count them. You may deplore this, but this is what we are faced with.

Now we recognize, and I think this will have to be -- you have made one request here -- this will have to be done with the acquiescence of the state. You said, could we or could someone get the Federal authorities to regulate their discharge flows. I think we have certain functions under the Act, and, if the state authorities are in agreement, we are available for consultation. Of course, this, again as Dr. Venable points it out, the primary right and responsibility for pollution control is with the State, and we work through the state. But you raised the question here about discharges from federal dams. I would suggest that the policy we have is in our Act, where is says, "Storage and water releases shall not be provided," these are for federal impoundments, "as a substitute for adequate methods of treatment or other methods of controlling waste at the source."

I would suspect, if we were to go into meeting a problem on a regulated stream, that this would probably have to be a complete package, with the state, with the federal people if you wanted us, and you, to get together and within a reasonable time examine the type of waste treatment practices at your plant and the possibility for modifying those and the possibility of modifying releases and storage practices in the reservoirs concerned, and the possibility of getting a system where these would be coordinated, the quality of releases with the quantity. This is what some of us back in Washington sometimes call water quality management.

Now again, I think your situation probably is different from the other sources of pollution here which, if remedial action is indicated, they have to get engineering work. With the industry, I don't say that is easy, but they have to get engineering work for compliance. The problem you have is considerably more sophisticated. You have the treatment works.

MR. MINCH: Yes.

CHAIRMAN STEIN: And you have the changes in stream flow, and we will have to bring the resources of all parts of the government to that end to try to coordinate it. Again, with the suggestions and acquiescence of the states, we would be delighted to work with you on an equitable solution to your problem.

Mr. Minch: We would like for you to make that a binding commitment.

DR. MYERS: Mr. Chairman, I would like to observe that the findings of this company also confirm the findings presented by the Alabama group.

CHAIRMAN STEIN: Do we have any further statements? Maybe we can get this concluded and maybe I can try to summarize to see where we are coming out.

Have you concluded?

MR. MINCH: Yes, I have finished.

The following is the complete "Statement of Georgia Kraft Company (formerly Rome Kraft Company) Rome Division to Conference on Interstate Pollution on The Coosa River."

STATEMENT

of

GEORGIA KRAFT COMPANY
(formerly Rome Kraft Company)
Rome Division

to

CONFERENCE

on

INTERSTATE POLLUTION

on

THE COOSA RIVER

I. The Rome Kraft Mill

Georgia Kraft Company (formerly Rome Kraft Company) is jointly owned by Inland Container Corporation, of Indianapolis, Inidana, and The Mead Corporation, of Dayton, Ohio. Its Rome Division operates a kraft containerboard mill on the Coosa River, at Krannert, Georgia (river mile C 268.65), approximately 15.25 river miles below Rome, Georgia, and 15.75 river miles above the Georgia-Alabama state line. The mill was built in 1954 and enlarged in 1961. It has a present capacity of 1400 tons of kraft containerboard per day and is a significant economic factor in this Georgia-Alabama area, employing some 900 people, with an annual pay roll of more than $6,400,000. Of this total pay roll, approximately $250,000 is paid to those employees who are residents of Alabama. In addition, $3,000,000 is paid annually to dealers and producers from Floyd County and neighboring Georgia and Alabama counties for pulpwood. Of this, roughly $1,200,000 is produced in Cherokee, De Kalb and Etowah Counties, Alabama. In Cherokee County alone, more than $11,000 is paid each week for pulpwood.

II. The Coosa River

The Coosa River is formed by the junction of the Etowah and Oostanaula Rivers at Rome. It flows in a southwesterly direction, crossing the Georgia-Alabama state line (river mile C 252.9) and continuing in a meandering course through the State of Alabama to its mouth, where it joins the Tallapoosa River near Wetumpka to form the Alabama River.

The Weiss Dam near Leesburg, Alabama, 43.75 miles below the Rome Kraft mill (river mile C 224.9), was completed in 1961, and is operated by Alabama Power Company for run-of-the-river generating under computer control. The dam backs water to an elevation of about 564 feet above sea level, and has changed the character of the Coosa River at the Rome Kraft mill from a fast-flowing, shallow stream to a lake.

From the Rome Kraft mill to Poole's Ferry (river mile C 247.9), approximately five miles within Alabama, the river, as impounded by Weiss Dam, remains approximately in its original channel. Throughout this entire stretch, the river winds through substantially uninhabited country which does not lend itself to recreational development. From Poole's Ferry to the Cedar Bluff area, there are increasing embayments, and, in the lower part of the stretch, there has been considerable recent development of summer cottages. The major part of the recreational activity takes place in lower Lake Weiss near and below Cedar Bluff (See Exhibit 1).

Another significant physical factor affecting the river is the Allatoona Dam, upstream on the Etowah River. Built by the Corps of Engineers for the generation of peaking power, this dam was closed in 1951. Allatoona's operation causes wide diurnal variations in the flow rate as far downstream as the Rome Kraft mill. The effect of this variation is discussed in Section IX below.

III. Pollution Control Planning for the Rome Kraft Mill

In 1947, when Rome Kraft decided to construct a kraft containerboard mill of 600 tons rated daily capacity, the Rome, Georgia, site was one of several considered. Rome Kraft was keenly aware of the importance to the successful operation of such a mill of both an adequate water supply and a river flow adequate to assimilate mill wastes 1/.

1/ It is important to note that the industrial wastes from a kraft containerboard mill do not contain pathogenic bacteria, toxic substances or other materials harmful to human health. These wastes, unlike domestic sewage, do not contaminate the river and cannot cause typhoid fever, hepatitis, or any other of the diseases caused by raw sewage. Essentially, a kraft containerboard mill's industrial wastes come from the wood used in the manufacturing process and consist of wood lignin, simple wood sugars, and other similar materials which are diluted in large amounts of water.

The measurement of such industrial wastes, in terms of population equivalent (P.E.), incorrectly implies that such wastes are the same as raw sewage. Since the only substantial effect of such wastes on the river is in the utilization of dissolved oxygen, it is more appropriate to express the Rome Kraft waste load in terms of the 5-day biochemical oxygen demand (B.O.D.), and that basis of measurement is, therefore, used throughout this statement.

Extensive studies were made for Rome Kraft to determine the assimilative capacity of the Coosa River at the proposed millsite. After favorable preliminary reports by Doctor Dunbar G. Terry, of the Mead Corporate Technical Service, Professor C. J. Velz, of the School of Public Health of the University of Michigan, was engaged to make a full-scale technical evaluation of the river's assimilative capacity. This report, prepared in August, 1951, was based on a mill producing 34 pounds of B.O.D. per ton of production at 600 tons daily production, or 20,400 pounds of B.O.D. per day. To project the effect of such a mill, Professor Velz used three flow levels--808, 1050 and 2020 cfs, which represented, respectively, the severe drought flow under unregulated conditions, the once-in-five year minimum daily average flow and the moderate low level flow. Professor Velz determined that, with 20,400 pounds of B.O.D. at 30° C and an 808 cfs flow, the maximum depletion in the oxygen would be to a level of 5.0 mg/l. At the same temperature and loading conditions, the 1,050 cfs flow would result in a minimum dissolved oxygen concentration of 5.3 mg/l and the 2,020 cfs flow would produce a minimum of 5.9 mg/l.

In addition to these projections, Professor Velz also developed data on somewhat higher loads. Using a loading of 49 pounds of B.O.D. per ton of production and 600 ton daily production, or 29,500 pounds of B.O.D. per day, Professor Velz calculated that only 1,050 cfs were needed to maintain a minimum dissolved oxygen level of 4.55 mg/l in the free flowing river. It is significant that the figure of 29,500 pounds of B.O.D. per day is very close to that which was produced by the mill at full production in its first years of operation.

The Velz report, therefore, provided an excellent basis for the technical decision that the mill could be operated at the Rome site without any adverse effects on the Coosa River 2/.

Although the flow projections for the Velz report were made on the basis of data collected prior to the closing of Allatoona Dam, these levels are, in fact, close to those which were encountered at the mill until the closing of the Weiss Dam.

2/ It is obvious that the discharge of mill wastes into the Coosa River would decrease the dissolved oxygen content of the river existing prior to the construction of the mill. However, the 4.55 mg/l of D.O. predicted by the Velz report provided an ample margin of safety above acceptable standards for river D.O. This is particularly true when it is realized that, at the time the Velz report was written, 3.0 mg/l of dissolved oxygen were generally considered adequate for the protection of river biota. The Public Health Service report indicates that the water quality at the Georgia-Alabama state line has been progressively degraded. The data for the "1955 Average D.O." and the "1957 Average D.O." shown in its Figure 9 was obtained, respectively, from September 6 through September 10, 1955, and from August 12 through August 23, 1957. During these two months, Rome Kraft obtained daily data on the river. This data more accurately reflects the Average D.O. during each of these months and establishes that the D.O. levels during such months were safely above the standards set by the Alabama Water Improvement Commission. Indeed, from Exhibit 8, it will be seen that the B.O.D. per cfs of river flow has decreased in the pre-impoundment period from 1955 through 1960.

IV. Mill Operations, 1954 through 1960

During the years 1954 through 1960, production was in the range of 600 to 800 tons per day, and caused no adverse effect on the river 3/. River data collected during this period established that the Velz projections were reasonably correct. Such data disclosed that, in the stretch of river which coincides with the low part of Rome Kraft's D.O. "sag" curve (from five miles above the Alabama-Georgia state line to five miles below the state line), the dissolved oxygen consistently exceeded 4 mg/l 4/. On days when river flow averaged 4,000 cfs, the average minimum would be 3,600 cfs and the average maximum 4,400 cfs (see Exhibit 2).

V. Plans for Expansion

In 1955, consideration was given to expansion of the mill to double its capacity. In connection with these plans, a further study of the river was undertaken by Messrs. V. A. Minch and F. J. Schott, of the Air and Stream Pollution Control Group of the Mead Research Department. As a basis for this report, it

---

3/ See Footnote 2/.

4/ In the years 1954 through 1960, 812 river samples were taken. 316 of these samples were taken in the ten-mile stretch described above, and of these 93.4 percent contained 4.0 mg/l or more of D.O., and 79.5 percent contained 5.0 mg/l or more of D.O. A leak in the lagoon dike was responsible for 28.6 percent of the samples below 4.0 mg/l. It is significant that a majority of the samples were taken during those months in which river conditions are normally critical.

was possible to use data gathered under actual mill operating conditions.

The survey was conducted from mid-June to early November, 1955. During this period, the river flow ranged from 870 cfs to 2840 cfs, production averaged 700 tons per day, and the B.O.D. load averaged 28,240 pounds per day or 40.3 pounds per ton of production 5/. Analysis of the flow data available at the time, which consisted of the five years since Allatoona Dam had been closed, showed that the minimum daily average was more than 870 cfs all of the time, in excess of 1370 cfs 95 percent of the time, and over 1820 cfs 90 percent of the time. The minimum average daily flow on a seven consecutive day basis was 1290 cfs all of the time, 1845 cfs or more 95 percent of the time, and 1975 cfs or more 90 percent of the time. River temperature during the period of the survey ranged from 20° to 25° C, but, for calculating purposes, 27° to 29° C was used.

For the purpose of establishing the maximum load which could be assimilated by the river, 1820 cfs (the minimum daily average to be expected 90 percent of the time) was taken as the basic flow rate. With this flow and a temperature of 27° C, it

---

5/ During the period of the 1955 survey, the B.O.D. load per day ranged from 13,100 pounds to 45,000 pounds, except on one day, when it was 65,000 pounds. It is interesting to note that the fast-flowing river was able to assimilate the 65,000-pound load without reducing the D.O. below 5.7 mg/l.

was concluded that 4.0 mg/l could be maintained without treatment at 1200 tons production, which would impose a load on the river of 48,400 pounds of B.O.D. per day.

At about this time, it was learned that Alabama Power Company was planning the construction of Weiss Dam, which would be closed concurrently with the completion of the Rome Kraft expansion. At a meeting in February, 1956, attended by representatives of Alabama Power Company, Rome Kraft, the Georgia Department of Public Health, and the Alabama Water Improvement Commission, the effect which the impoundment would have on the assimilative capacity of the river was fully discussed. All of the parties except Alabama Power agreed that a reduction in the assimilative capacity of the river would result from the impoundment. It is significant that none of the parties was able to establish precisely the extent of this reduction or the level of waste load which the impoundment could assimilate.

Thereafter, based on the best estimates available, the Georgia regulatory officials required that the waste load to the stream not be increased. This meant that treatment facilities for a 50 percent reduction of B.O.D. from the doubled capacity mill would have to be installed. The Alabama authorities continued their minimum requirement of 4.0 mg/l of dissolved oxygen at the state line.

VI. Additional Treatment Facilities

Pilot plant studies to determine the type of treatment which would best provide the 50 percent removal required by the Georgia authorities were carried out over a considerable period of time, both at Rome and at the Mead Research Laboratories at Chillicothe, Ohio. Dr. Clair N. Sawyer, of Metcalf and Eddy, consulting engineers, of Boston, Massachusetts, reviewed and approved both the manner in which the pilot plant studies were conducted and the process design for the treatment plant. This work formed the basis for the design of the original treatment plant at Rome Kraft, which was built at a cost of $1,300,000, and includes a trickling filter incorporating for the first time in this country a new plastic media (see Exhibit 3).

The treatment plant is designed to remove 28,000 pounds from a B.O.D. load of 56,000 pounds per day in a flow of 16 mgd at a temperature of 43° C at the filter. The design loading of the filter is 3.2 million gallons per thousand square feet per day and 560 pounds of B.O.D. per thousand cubic feet of media. The tower contains 100,000 cubic feet of polyvinyl chloride trickling filter media developed by the Research Department of The Mead Corporation and manufactured by B. F. Goodrich Company (see Exhibit 4). 6/

6/ The 100,000 cubic feet of filter media has a packing surface of 3,700,000 square feet. This filter is the equivalent of a rock filter six feet deep covering an area of 100,000 square feet or approximately 2.3 acres.

After treatment in the trickling filter, the wastes are settled in a 160 foot diameter, 11 foot sidewall depth, Eimco clarifier, which is equipped with a skimming device for the removal of floating solids. Retention time in the clarifier is 2 hours at an upflow rate of approximately 0.5 gallons per minute per square foot. The solids removed by the skimmer and sludge underflow from the clarifier are now pumped to a drying area. From the clarifier, the effluent enters a 1,000,000 gallon aeration tank, where it is sprayed into the air at a rate of 15,000 gallons per minute. The retention in this aeration system is approximately 1.3 hours. The wastes are then held for a period of 2 to 3 days in five shallow aeration lagoons which have an average depth of four feet and a total surface area of 21.6 acres. Between each of these lagoons, the waste tumbles over a small cascade aerator. From the lagoons, the effluent is carried through a 36" line for discharge through a submerged diffuser into the Coosa River.

Since its start-up, the treatment plant has consistently removed 28,000 pounds of B.O.D. per day except during the winter months 7/. However, because of increased loadings to the treatment plant resulting from the mill expansion, the B.O.D. load to the river has exceeded the standard of 28,000 pounds per day set by

---

7/ In common with all trickling filter plants, the Rome Kraft treatment plant loses some efficiency during periods of cold weather. Such loss of efficiency is not significant, since river conditions are not critical during the winter months.

the Georgia regulatory authorities. This situation has been alleviated to some extent by improved treatment plant operating techniques resulting from two years of experience, particularly in the area of disposal of settled sludge, and by the installation of a skimming system in the clarifier 8/.

To satisfy its obligation to maintain stream loadings at the level existing prior to the mill expansion, the management of Rome Kraft is now spending $2,500,000 for the addition of a 225-foot diameter primary clarifier to the treatment plant and the making of substantial modifications in the mill. Construction of the clarifier has been completed, and it is anticipated that the mill modifications will be completed early in 1964.

VII. Present River Conditions

The data collected to date from the time of the closing of Weiss Dam and the concurrent start-up of the addition to the mill has shown that good oxygen conditions can be maintained when an adequate flow of water reaches the mill. However, survey data collected during the low-flow periods in both 1961 and 1962 indicate that the river is now not able to assimilate the normal mill loads applied during such critical periods 9/.

8/ It is unfortunate that the improved technique for the disposal of settled sludge was not in use in August, 1962, when the Public Health Service survey was being conducted. If this equipment had been operating during the period of the survey, the downstream D.O. would have been higher.

9/ Rome Kraft records show that during low-flow periods there have been occasions when the D.O. of the river water coming to the mill has dropped to 4.0 mg/l or less.

VIII. Effect of Weiss Dam on Assimilative Capacity

The closing of the Weiss Dam has significantly changed the character of the Coosa River all the way from the dam to Mayo's Bar above the Rome Kraft mill. Instead of a shallow, fast-moving stream, the Coosa River is now a deep, slow-moving lake.

Prior to the impoundment, the Rome Kraft effluent was easily assimilated by the river, and the cyclic flow from Allatoona Dam had no significant effect. Since the closing of Weiss Dam, there has been a sharp reduction of the assimilative capacity in the impoundment. Exhibit 5 shows the typical oxygen "sag" curve before and after construction of Weiss Dam.

Subsequent to the Public Health survey and when Rome Kraft fully began to appreciate the substantial reduction in the assimilative capacity of the Coosa River, Dr. Peter A. Krenkel, head of the Graduate School of Sanitary Engineering at Vanderbilt University, a stream assimilative specialist and consultant, was retained by Rome Kraft to make a new and thorough study of the river under the existing impoundment conditions.

In his report, Dr. Krenkel points out how extensive the loss of assimilative capacity has been. Although prior to the closing of Weiss Dam, the river (as shown by the Minch-Schott report) could assimilate 48,000 pounds of B.O.D. per day at the minimum daily average flow of 1820 cfs, which could be expected 90 percent of the time, Dr Krenkel has found that the impoundment can now assimilate only 10,000 pounds of B.O.D. per day under substantially the same conditions. This means that there has been a loss of approximately 80 percent in the river's assimilative capacity. Dr. Krenkel attributes this loss to a combination of the factors of increase in depth and temperature and of reduction in velocity. The increase in depth and the reduction in velocity have substantially reduced the aeration which took place in the free-flowing river, and have also permitted surface thermal stratification, which further reduces assimilative ability.

IX. Effect of Allatoona Dam

The present river situation is now also affected by the fluctuating flow pattern produced in the river by the peaking power operation of Allatoona Dam.

Although a small house generator producing a flow of 202 cfs is continuously operated, the significant flows from Allatoona come when generation for peaking operations is in progress. This occurs from Monday through Friday and usually only 4 to 8 hours out of each 24. The effect of this cyclic flow pattern is now easily detectable at the Mayo's Bar gauge (see Exhibit 6).

From this exhibit, it will be seen that the low flow from Allatoona reaches Mayo's Bar in approximately 24 hours. The week-end low flow from Allatoona reaches Mayo's Bar Saturday night and continues until Monday night 10/.

Prior to the closing of the Weiss Dam, the cyclic flow from Allatoona was dampened by the time it reached the mill (see Exhibit 2), and did not substantially affect mill operations. Now, when the surge of water from the Allatoona peaking operations reaches Mayo's Bar, it spills over into the backwater of the lake behind Weiss Dam. Rather than being dissipated in the embayment, the diurnal flow pattern carries through the reservoir to Poole's Ferry.

The average flow past the mill has not changed since the Weiss Dam was closed. However, the river velocity at the mill now much more directly reflects the cyclic flow from Allatoona and results in higher maximum flows and lower minimum flows at the mill, consequently reducing, particularly during Sunday and Monday, the assimilative capacity of the river at Rome Kraft.

In addition, the peaking flow past the mill outfall makes it difficult to obtain maximum dilution of the effluent. Normally, the mill effluent is discharged at a constant rate. However, a constant rate discharge into a varying rate of flow results in a rate of dilution which varies with the flow pattern.

10/ The effect at the Rome Kraft mill occurs approximately one hour after the effect at Mayo's Bar.

This situation further aggravates the problem in the river below the mill by causing depletions of oxygen to levels below that which would result if average dilution could be obtained.

In the spring of 1962, a valve was installed in the discharge line from the last lagoon to the river and is now used to cycle the effluent discharge in accordance with the cyclic river flow at the discharge point. Because of the lack of adequate head from the last lagoon, however, it was not possible to discharge effluent at a rate adequate to take advantage of the flow at the peak of the river cycle. This situation has been rectified this summer by the installation of a 22,000 gpm pump.

X. Carters Dam

The Corps of Engineers is presently undertaking the construction of Carters Dam on a tributary of the Oostanaula River. This dam will also be operated as a peaking power dam and could further change the characteristics of the Coosa River by aggravating the adverse effect of the cyclic flow at the Rome Kraft mill, particularly the weekend low flow. Rome Kraft is deeply concerned about this new development, and strongly urges that appropriate steps be taken by the proper agencies to so regulate and flow from Carters Dam that it will lessen rather than increase the cyclic flow in the Weiss impoundment at the Rome Kraft mill.

XI. Public Health Service Survey

The Public Health Service survey was conducted during August of 1962 at a time when the river flow was extremely low. Rain-fall data indicates that, in this part of Georgia, the month was one of the worst drought periods in the last 15 years.

In addition, samples obtained by the Public Health Service were taken at a depth of five feet below the surface. Prior to this survey, it had been the custom of both Rome Kraft and the State regulatory agencies to sample at a depth of approximately 1.5 feet below the surface. In any impoundment, the dissolved oxygen decreases from the surface to the bottom, and, consequently, the deeper sampling depths used by the Public Health Service resulted in a more critical evaluation of river conditions (see Exhibit 7).

XIII. Summary and Conclusion

Rome Kraft operated its mill on the Coosa River from 1954 to 1961 without adverse effect on the river and in compliance with the requirements of the regulatory agencies of both Georgia and Alabama. During this period, production averaged 700 tons per day and the daily B.O.D. load on the shallow, fast-flowing river was approximately 28,000 pounds.

The Velz report, prepared prior to construction of the mill, predicted that this load, involving no treatment, could be assimilated by the river with some safe reserve. The Minch-Schott report in 1955 confirmed Professor Velz's projections, and, on the basis of available operating data, concluded that the river could safely assimilate a B.O.D. load of 48,000 pounds per day.

When Rome Kraft determined to double its productive capacity, it obtained the best technical advice available and, at a cost of $1,300,000, installed a waste treatment plant of the latest design. To maintain the waste load to the river at the same level as existed prior to the mill expansion, Rome Kraft has made continuing improvements to its waste treatment plant, and, based on operating experience over the last two years, is now spending $2,500,000 for additional equipment for this purpose.

However, Weiss Dam, built by Alabama Power Company for its own economic benefit, has changed the Coosa River at the Rome Kraft mill from a fast-flowing shallow stream to a lake.

It has been conclusively established that impoundment, involving reduction in velocity and increase in depth, substantially reduces the assimilative capacity of a river. Using data obtained during the fall of 1962, Dr. Krenkel has calculated that during low-flow periods, the river, as impounded by the Weiss Dam, can now assimilate only 10,000 pounds of B.O.D. per day, a reduction of approximately 80 percent of its assimilative capacity (see Exhibit 8).

This reduction in assimilative capacity is equivalent to a major source of pollution in the Coosa River. It is, therefore, the impoundment by Alabama Power Company of the waters behind the Weiss Dam and not additional burden to the river caused by effluent from Rome Kraft which has substantially reduced the dissolved oxygen quality of the Coosa River at the Alabama-Georgia state line 11/.

It has lone been recognized that this country's rivers can and should serve a multitude of purposes. As the Public Health Service report points out, they are, of course, used for municipal, agricultural and industrial water supplies, for fishing, boating, swimming, and other recreational activities, for transportation, and for generation of power. No one can dispute the importance of adequately protecting our waters for this important purposes. Nevertheless, this country cannot afford to lose sight of the fact that our waters also serve a vital function in receiving and purifying municipal and industrial wastes.

Rome Kraft recognizes that industry must continue to do its part in the protection of our waters. The welfare of the Rome area, however, is bound up with the economic well-being of its industries. If any industry is called upon to contribute an undue proportion of the cost of stream improvement so that other water users may, without contribution to the cost, enjoy economic

---

11/ Again it should be noted that the Rome Kraft industrial wastes are not harmful to human health, nor do the wastes appreciably contribute to the color problem in the river.

and other benefits, the economic welfare of the entire community could suffer.

As this statement evidences, Rome Kraft has, continuously from the original planning for its mill, been keenly aware of its responsibilities in the area of water pollution control. It has spent substantial sums of money for the installation and operation of its treatment plant. It has pioneered in the development of a new type of trickling filter. It has fully cooperated with the regulatory agencies and the Public Health Service in the monitoring and surveying of the river. It is now spending another large amount of money to further reduce the waste load to the river.

Rome Kraft sincerely believes that, with the completion of the improvements now under way, it will have done its full share in the protection of the Coosa River. As with any industry, there are limits to the moneys available for treatment plant facilities. Rome Kraft, its employees, and the Rome community clearly understand that if an undue proportion of the responsibility for correcting the present river condition caused by the Weiss impoundment is assigned to Rome Kraft, it may have no alternative than to reduce production with its attendant reduction in employment and income in this Georgia-Alabama area.

The waters of the Coosa River and the Weiss impoundment can and should satisfy the needs of both recreational and industrial waste assimilation users.

The water quality in the lower part of Lake Weiss is now better than the Coosa River water quality in this area prior to the impoundment. This portion of Lake Weiss, from the Cedar Bluff area to the Weiss Dam, constitutes more than 84 percent of the total area of the impoundment. It is now used for all types of recreational water purposes and is completely adequate in size and water quality to continue to serve this purpose for years to come.

The reach of Lake Weiss from Poole's Ferry, past the Alabama-Georgia state line, up to the Rome Kraft Mill constitutes less than 6 percent of the area of the impoundment, is located substantially within the original banks of the river, and is not used or needed for recreational activities. This stretch of river has been used and should continue to be used for the legitimate water use purpose of assimilation of industrial wastes.

The need for recreational water has been satisfied by the large area in the lower part of Lake Weiss. The satisfaction of this need has resulted in a loss of 80 percent of the assimilative capacity in the upper reach of the lake. To require that water quality in this stretch of the river be maintained at recreational standards would result in Rome Kraft's bearing the cost of water recreation in this now unused, relatively small area of the river. The additional recreational benefit to the community would be greatly outweighed by the loss in employment and income in this Georgia-Alabama area, which would inevitably result. To maintain such water quality, Rome Kraft would have no alternative than to substantially decrease its production, its employment, and its pulpwood purchases.

It is, therefore, respectfully submitted that this Conference make the following findings:

1. The Weiss impoundment has reduced the assimilative capacity of the upper reach of the Coosa River from Poole's Ferry to the Rome Kraft mill approximately 80 percent.

2. Such reduction of assimilative capacity is equivalent to a major source of pollution in the Coosa River.

3. The upper reach of the Coosa River from Poole's Ferry to the Rome Kraft mill should be considered an Industrial Waste stream.

4. The industrial wastes of the Rome Kraft mill do not endanger the health of persons either in Alabama or Georgia.

5. The ruling of the Georgia State Health Department that Rome Kraft be permitted to discharge into the Coosa River a B.O.D. load of 28,000 pounds per day is reasonable, and such discharge will not endanger the welfare of persons either in Alabama or Georgia.

6. The Federal Government should require that the operation of Allatoona Dam be adjusted to augment the flow in the Coosa River during low-flow periods so as to provide a minimum flow of 1800 cfs at Mayo's Bar.

7. The Federal Government should also require that the operation of Weiss Dam be coordinated with Allatoona Dam's adjusted operation to assure that, during low-flow periods, such minimum flow at Mayo's Bar is concurrently passed through the Weiss impoundment.

8. In addition, the Federal Government should require that the governmental agencies responsible for Carters Dam regulate and coordinate its operation to assure that the foregoing minimum flow be maintained at Mayo's Bar, and that the cyclic flow from Carters Dam complement, rather than aggravate, the cyclic flow from Allatoona Dam.

9. Since the responsibility for the Weiss impoundment and the resultant loss of assimilative capacity of the Coosa River does not rest with Rome Kraft, Rome Kraft should not bear the sole responsibility for maintaining a fixed D.O. standard at the Georgia-Alabama state line.

EXHIBIT 1

COOSA RIVER AND WEISS IMPOUNDMENT

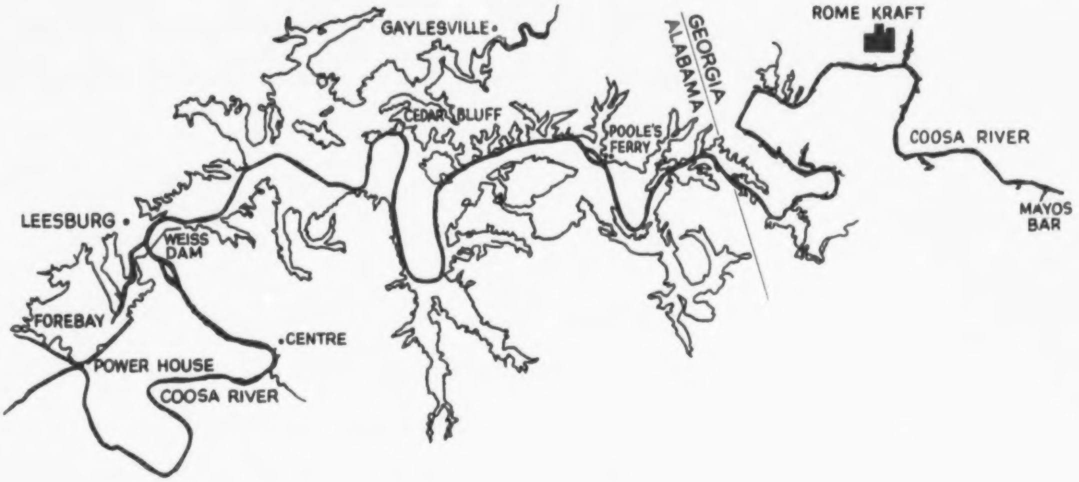
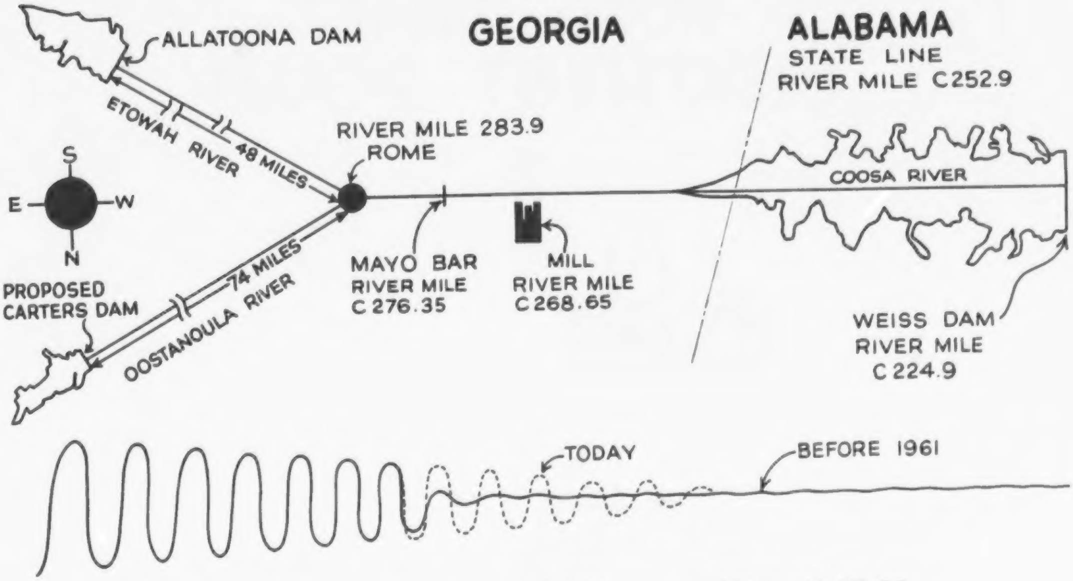

GAYLESVILLE
GEORGIA
ALABAMA
ROME KRAFT
CEDAR BLUFF
POOLE'S FERRY
COOSA RIVER
MAYOS BAR
LEESBURG
WEISS DAM
FOREBAY
CENTRE
POWER HOUSE
COOSA RIVER

EXHIBIT 2


ALLATOONA DAM
GEORGIA
ALABAMA
STATE LINE
RIVER MILE C252.9
ETOWAH RIVER
48 MILES
RIVER MILE 283.9
ROME
S
E
W
N
COOSA RIVER
MAYO BAR
RIVER MILE
C 276.35
MILL
RIVER MILE
C 268.65
PROPOSED
CARTERS DAM
74 MILES
OOSTANOULA RIVER
WEISS DAM
RIVER MILE
C 224.9
TODAY
BEFORE 1961

	ALLATOONA DAM	ROME GAGE	MAYO BAR	ROME KRAFT CO.	
				BEFORE 1961	TODAY
LOW	239 cfs	1,500 cfs	1,800 cfs	3,600 cfs	1,800 cfs
AVERAGE	3,000 cfs	4,000 cfs *	4,000 cfs *	4,000 cfs *	4,000 cfs *
HIGH	8,000 cfs	6,500 cfs	6,000 cfs	4,400 cfs	6,000 cfs

* INCLUDES BOTH ETOWAH AND OOSTANOULA RIVER FLOW

EXHIBIT 3

ROME KRAFT TREATMENT PLANT

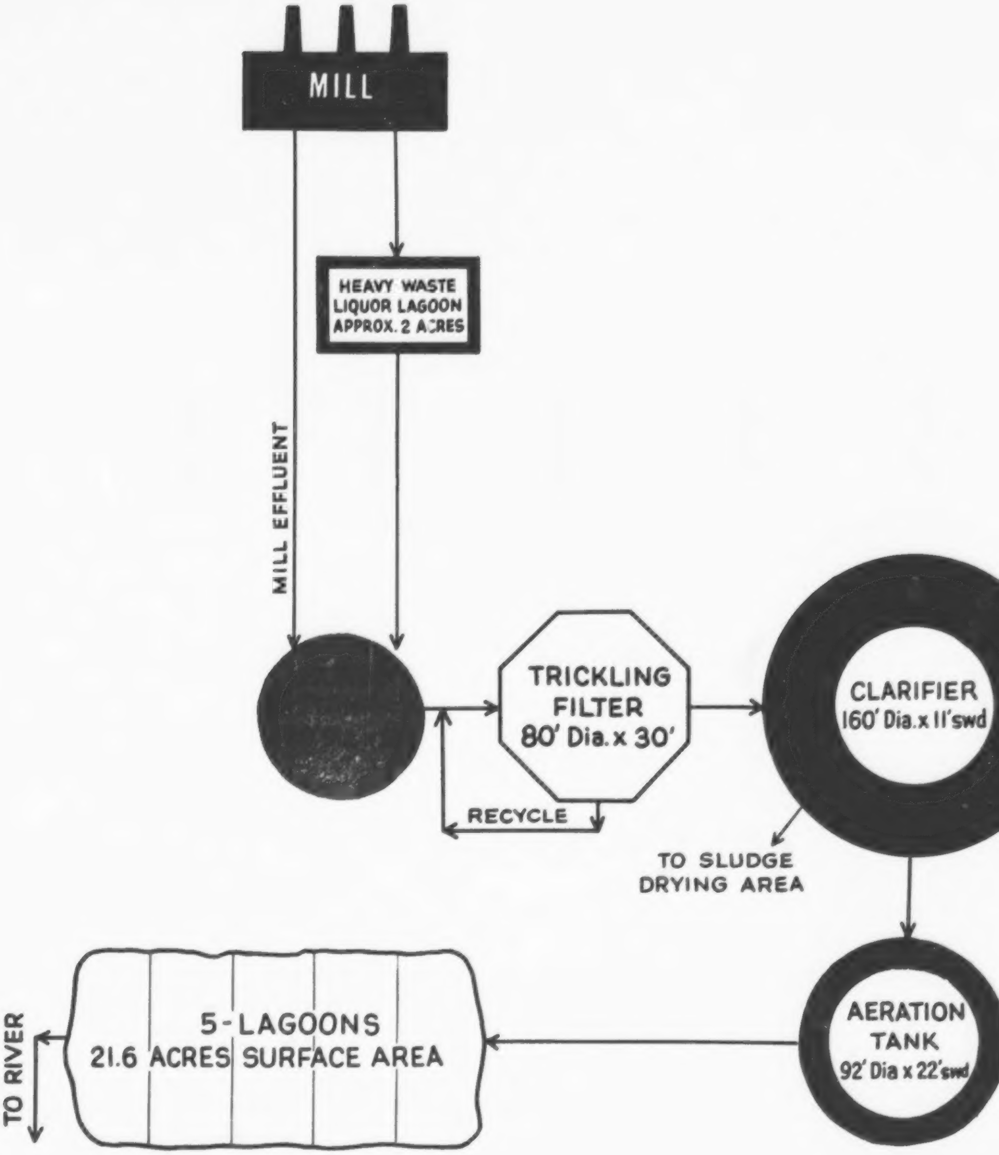

MILL
HEAVY WASTE LIQUOR LAGOON APPROX. 2 ACRES
MILL EFFLUENT
TRICKLING FILTER 80' Dia. x 30'
RECYCLE
CLARIFIER 160' Dia. x 11' swd
TO SLUDGE DRYING AREA
AERATION TANK 92' Dia x 22' swd
5-LAGOONS 21.6 ACRES SURFACE AREA
TO RIVER

EXHIBIT 3

ROME KRAFT
TREATMENT PLANT

(INCLUDES NEW WASTE TREATMENT CONTROL FACILITIES INSTALLED DURING 1963)

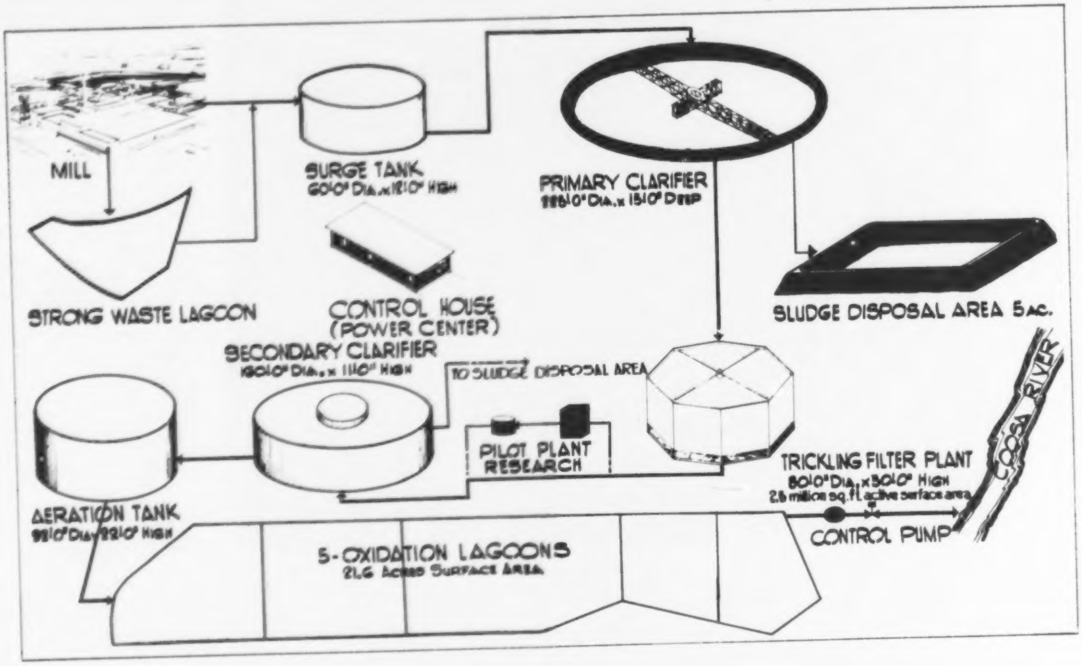

MILL
SURGE TANK
60'0" DIA. x 18'0" HIGH
PRIMARY CLARIFIER
226'0" DIA. x 15'0" DEEP
STRONG WASTE LAGOON
CONTROL HOUSE
(POWER CENTER)
SLUDGE DISPOSAL AREA 5 AC.
SECONDARY CLARIFIER
130'0" DIA. x 11'0" HIGH
TO SLUDGE DISPOSAL AREA
PILOT PLANT
RESEARCH
COOSA RIVER
TRICKLING FILTER PLANT
80'0" DIA. x 30'0" HIGH
2.6 million sq. ft. active surface area
AERATION TANK
98'0" DIA. x 22'0" HIGH
CONTROL PUMP
5-OXIDATION LAGOONS
21.6 ACRES SURFACE AREA

EXHIBIT 4

■ *Report to business from B.F.Goodrich*

Despite its 16-million-gallon-a-day capacity, this new water treatment plant constructed by The Rust Engineering Company takes up very little land. Non-combustible BFG Koroseal vinyl core units can be stacked to heights of 40 feet or more.

King-size filter makes water come clean

Paper company alleviates pollution problem with unique cost-cutting B.F.Goodrich Koroseal vinyl core units. In the picture at the left, the two men are lifting into place what looks like a slice from a giant honeycomb.

Actually, it's one of the 6,250 Koroseal vinyl core units that make the Rome Kraft Company's new water treatment plant the most economical ever built.

Tucked among the hills of Rome, Georgia, the new plant is cleaning waste water from one of the country's largest pulp and paperboard mills and doing it ten times faster and with far less expense than any comparable method that existed before.

Because crushed rock or stone trickling filter systems require too much land or cost too much they are not practical for many mills. They also require considerable maintenance under normal operating conditions.

Scientists of The Mead Corporation together with those of Rome Kraft, a Mead affiliate, felt they could build an efficient treatment plant, with more square feet of working surface in proportion to area occupied, if they used a plastic in honeycomb form. They tested various plastics and found B.F.Goodrich Koroseal best—in structural strength, ease of installation, resistance to chemicals, and because it requires practically no maintenance. While this plant was designed for pulp and paper waste, the same principle can be applied to other industries or to municipal sewage treatment.

This is another example of the many ways B.F.Goodrich people are combining basic materials—plastics, rubber, chemicals, textiles, metals—with imaginative thinking to produce a product that solves a challenging problem. For more information, write the President's Office, *The B.F.Goodrich Company, Akron 18, Ohio.*

B.F.Goodrich

EXHIBIT 5

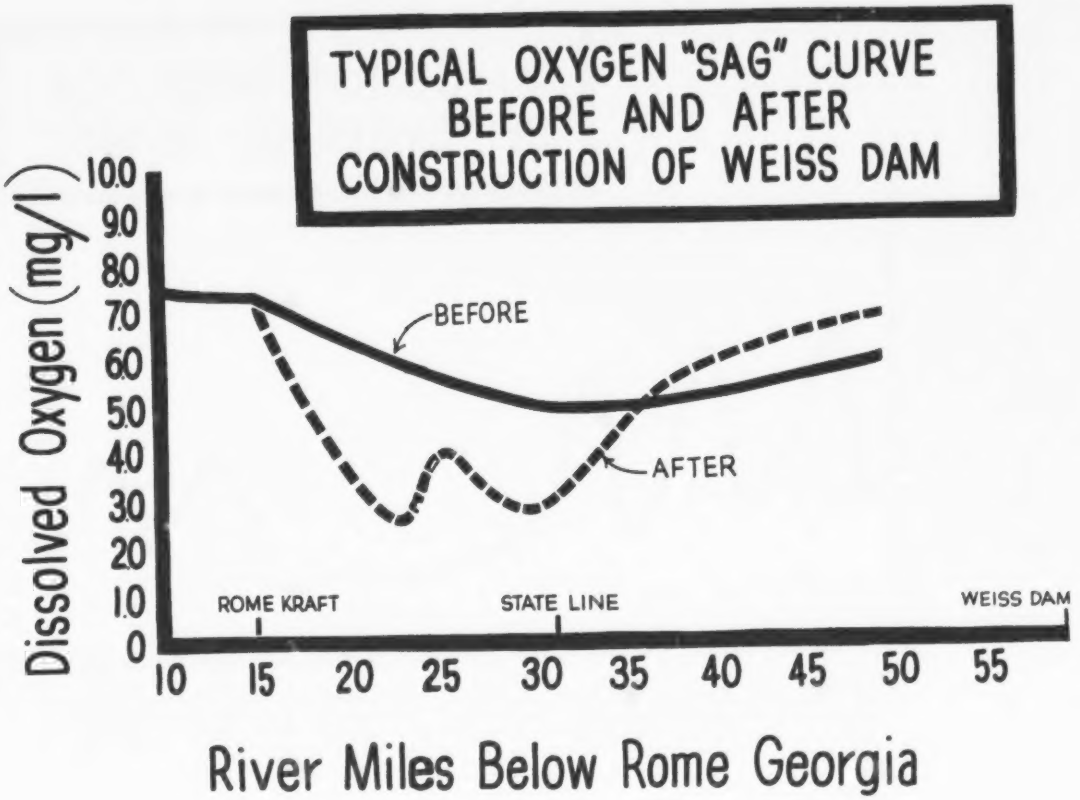

TYPICAL OXYGEN "SAG" CURVE
BEFORE AND AFTER
CONSTRUCTION OF WEISS DAM
Dissolved Oxygen (mg/l)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
BEFORE
AFTER
ROME KRAFT
STATE LINE
WEISS DAM
10
15
20
25
30
35
40
45
50
55
River Miles Below Rome Georgia

EXHIBIT 6

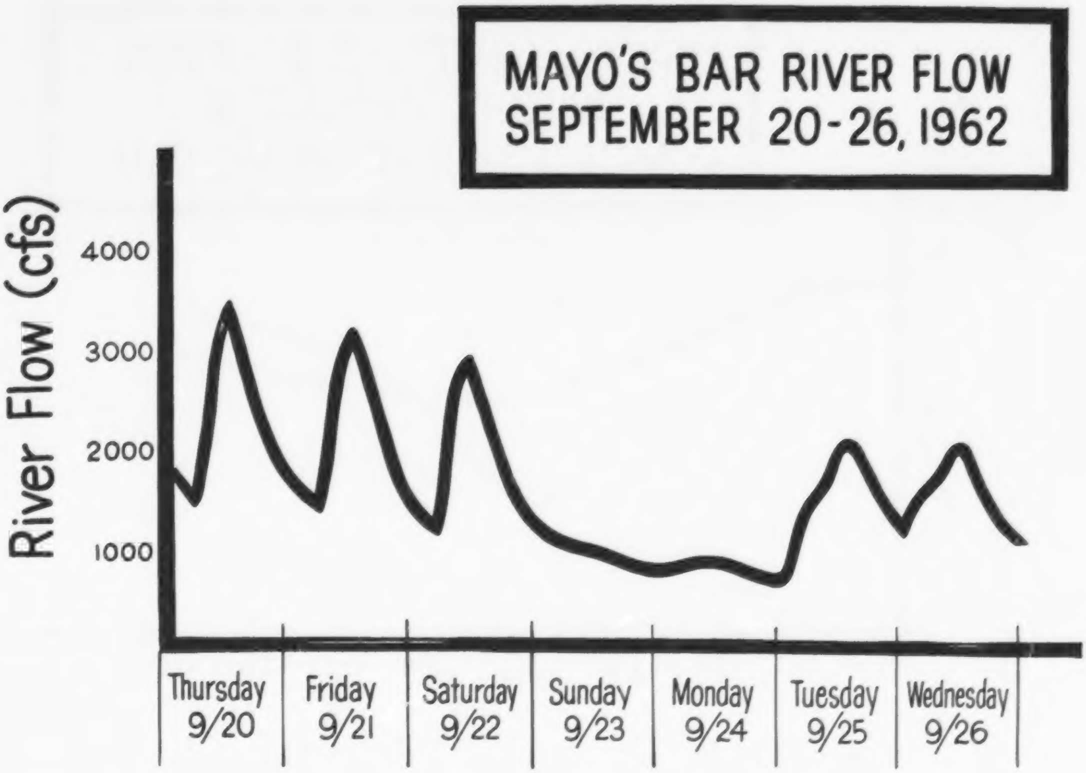
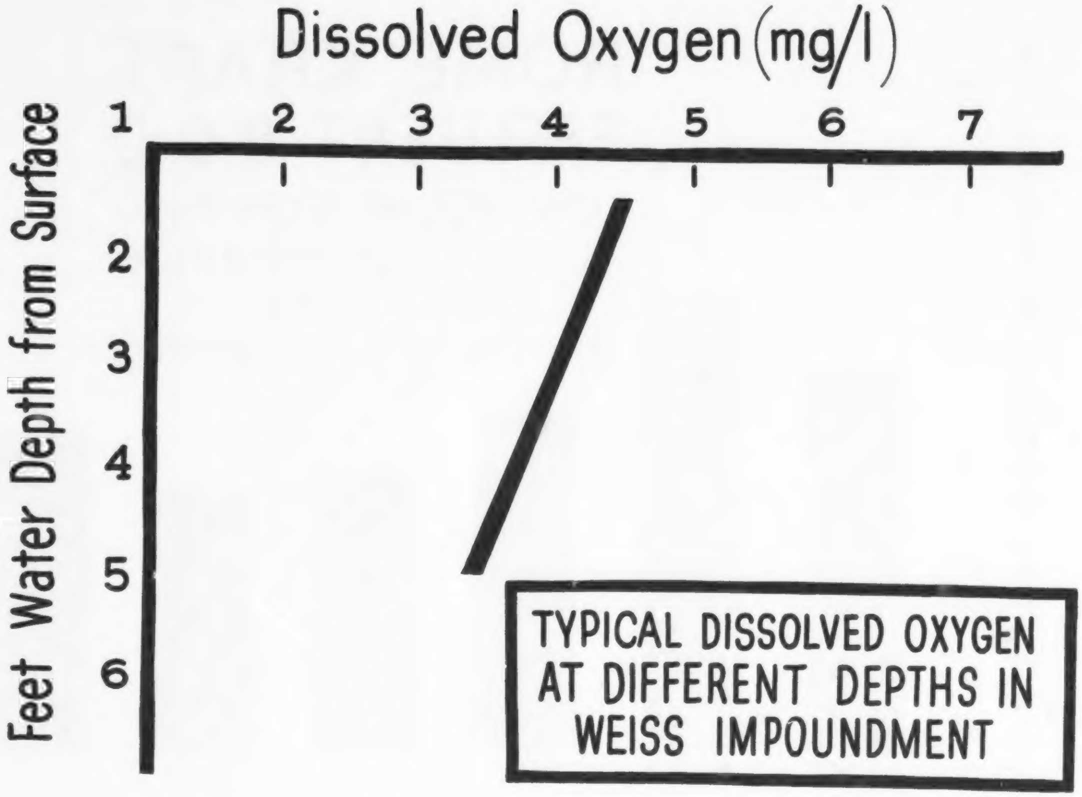
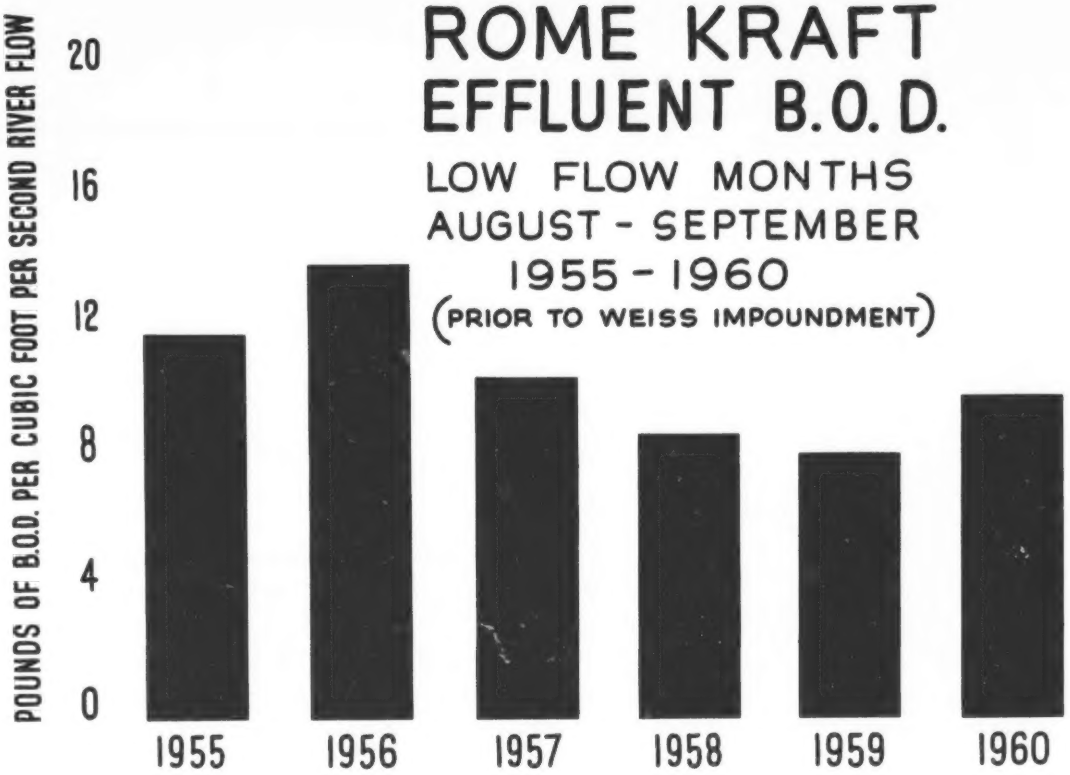

MAYO'S BAR RIVER FLOW
SEPTEMBER 20-26, 1962
River Flow (cfs)
4000
3000
2000
1000
Thursday 9/20
Friday 9/21
Saturday 9/22
Sunday 9/23
Monday 9/24
Tuesday 9/25
Wednesday 9/26

EXHIBIT 7



TYPICAL DISSOLVED OXYGEN AT DIFFERENT DEPTHS IN WEISS IMPOUNDMENT

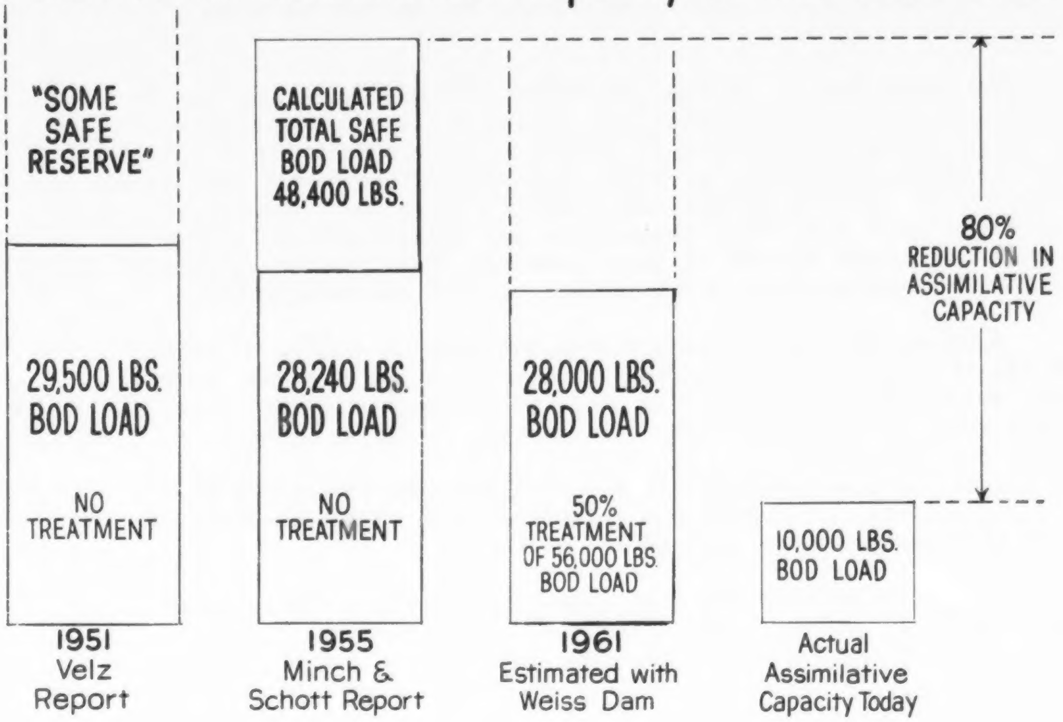
EXHIBIT 8



ROME KRAFT
EFFLUENT B.O.D.
LOW FLOW MONTHS
AUGUST - SEPTEMBER
1955 - 1960
(PRIOR TO WEISS IMPOUNDMENT)

EXHIBIT 9

Reduction in Assimilative Capacity of the Coosa River



CHAIRMAN STEIN: I think it is fairly well agreed, anyway -- I hope so -- that the Coosa River System between Georgia and Alabama is an interstate water within the meaning of the Federal Water Pollution Control Act.

The Department of Health, Education, and Welfare survey of the river indicated that the waters of the Coosa River System were polluted by municipal and industrial discharges in the State of Georgia; that the effects of this pollution persisted to and beyond the Alabama State Line. The type of pollution can be broken down into organic pollution which comes from communities and industries, and this depletes the oxygen content of the stream and makes the waters less useful for propagation and development of fish and aquatic life.

From the municipalities and from the domestic wastes of some of the industries, a combination of these leads to bacterial pollution which presents a hazard to those in Alabama using the Coosa River near the state line for water contact sports.

Silt and clay pollution from mineral washing discharges in Georgia persists to Alabama and interferes with the development of fish life, recreation, fishing, and so forth.

I don't know that both state agencies represented here would agree with all of these conclusions, or any of them; but I might give one more conclusion. I think it seemed to be indicated by the Department of Health, Education, and Welfare's report that a minimum-I say, minimum; not an average -- minimum of 4.0 ppm of dissolved oxygen would be required to maintain relatively clean water at the Alabama-Georgia state line, and that the coliform count should be 1,000 or less. That would be the requirements.

Now I would suspect that the Alabama authorities would agree, at least in large measure, with the report. I think it coincides with theirs; that pollution from sources in Georgia, from municipal and industrial sources in Georgia, coming across the state line create a significant change, a damage in the fishery, and you have pollution from untreated sewage and discolored wastes from mining operations, which are, as you put it, a threat to the development of Weiss Lake for recreational purposes. And I think, by and large, the Department's report and the report that Alabama had can be reconciled, as far as the summary, and they are in agreement.

Am I in agreement, too, that the requirements you would have on the state line are 4.0 ppm minimum and a 1,000 count of the coliform?

DR. MYERS: We do not have a level on coliform. We do not have a standard in that regard. We haven't required it of our own industries, nor have we chose to impose something on our neighboring state that we have not been able to identify within our state.

The request which we have made in 4.0 ppm at the state line is what we require of our industry at the site. Now what we are saying is that we want to receive water from our neighboring state in a manner similar to that which we would require of our industries at the site -- and this has worked very nicely within the state.

I want to call attention to one or two things. I think that in connection with this we have talked about treatable water versus this contact sports type water, and I don't know whether this is the appropriate time to mention it; but, since we are talking about standards, I think it is an entirely different type of water we are talking about - that that can be treated, and that which is safe for contact sports. The levels of contamination are quite different.

We have not chosen to identify specifically the type of pollution beyond that of the dissolved oxygen. We have recommended and suggested that the municipal sewage reaching our state should have primary and secondary treatment, with chlorination, for the safety of those who will be participating in contact sports.

Now in terms of what the coliform count might be, that would vary a great deal with what other factors might be involved in this coliform count. Not only municipal sources are involved in that.

CHAIRMAN STEIN: Doctor, I think -- maybe our technical people would disagree with me -- I think this is entirely acceptable to the Department. In other words, we would agree, as a measure, that the municipal wastes and sewage wastes should receive primary and secondary treatment with chlorination before they reach your shores, I think, rather than the count of 1,000. This would be, I think, perfectly acceptable. If any of our technical people have any different view, let me know.

Now I want to see what area of agreement we may have with Georgia. Would the Georgia people agree -- and I don't know that you agree to anything -- that the silt constitutes an interstate pollution problem?

DR. VENABLE: Mr. Chairman, I think you are eminently correct. I, with all the faults of this report, would still have to agree, insofar as the intra-Georgia situation is concerned, that your facts are correct. I differ with you in your conclusions.

CHAIRMAN STEIN: I am fairly sure we won't possibly get an agreement with Georgia on the effect of untreated sewage at the state line, possibly. But what I was trying to say is: Don't you believe that the silt -- while we of the Department of Health, Education, and Welfare, and Alabama may have a notion of what should happen to sewage before it hits the state line -- would you agree, or would you not, that the silt from the mine washing operations, particularly the New Riverside Ochre Company, are polluting the Coosa River System in Alabama?

DR. VENABLE: I am rather afraid that our definitions of pollution do not coincide. I certainly would agree that silt does reach the Alabama segment of the river from an origin in Georgia.

CHAIRMAN STEIN: But you would not say that it endangers health or welfare in Georgia?

DR. VENABLE: No, sir. I do not see anything in this report, in ours, or in Alabama's that would indicate anything other than unpleasantness, and I would like to again state that I do not have any criticism at all for people who fish, use, or build on a muddy lake. I think it's up to us to clear this up, but I do not see any evidence to establish that this has adversely affected the health and welfare.

CHAIRMAN STEIN: I think the purpose of what we are doing now is to summarize this conference, and I think we have a fairly clear expression of views here.

Now if what you say, taking your assumption, Dr. Venable, if there is no interference with health or welfare, and I haven't seen any requests from the Governor of Georgia lately for Federal action, this would be purely a matter of state concern for a clean-up in Georgia under our law. In other words, if there were pollution which did not affect -- even if there were intrastate pollution and it did not endanger health or welfare of persons in another state, we would have no business in here, unless the Governor asked us.

DR. VENABLE: Are you still talking about silt?

CHAIRMAN STEIN: I beg your pardon?

DR. VENABLE: Are you still talking about silt?

CHAIRMAN STEIN: No. I mean the whole problem, any pollution. So I don't know that you would agree that we or Alabama have an interest in what is going to happen to the industries and communities in Georgia. Since both Alabama and the Department of Health, Education, and Welfare have come to the conclusion that pollution from municipal and industrial sources endanger health or welfare of people in Alabama, they feel they have an interest. I think, as part of the summary, we might explore that.

There are three cities concerned; one is Trion, one Summerville, and one is Rome, Georgia. I think, speaking for the Department, and we haven't talked it over here -- if the Summerville date, considering the problems of financing in a small town, of 1966 holds up, and Rome, Georgia in 1964 begins construction, it would seem to me that this might constitute a reasonable schedule of compliance.

We would hope that we would hear in the reasonable future from Riegel Textile with Trion, and if their schedule can fall somewhere within the same time limits -- again, we recognize that you have to consult with your engineer -- I would assume that that would be reasonable.

Now we haven't had too much information presented here on what work the New Riverside Ochre Company was doing. I think Mr. West's report -- and I have no criticism of this portion of it -- indicated that on the basis of the Thompson Weinman experience, silt from these mineral washings can successfully be kept out of the Coosa River System. He suggests that the Thompson Weinman system possibly be improved so as to have some safety factors and not permit accidental negligent releases.

Now there has been no time indicated here. I am sure, if the New Riverside Ochre Company has already started work, and they have that example of what the Thompson Weinman Company has demonstrated it could do, particularly with proper operation in August, there should be no difficulty in cleaning up the silt within a year or so.

You will recall Mr. West's report that in July, when they looked at Thompson Weinman, the operation and maintenance were such that a lot of silt was getting into the stream. When the report was done in August, they were doing a rather good job of keeping the silt out. The question here is that you have to have some kind of mechanism where they are going to work fine, whether the state or federal authorities are around or not. This can be done, as I think Rome Kraft has indicated. They have done a pretty good job on their own.

Now there are various other industries in Georgia which should fit into a commensurate schedule.

As far as the Rome Kraft Company, I think we have made the proposition -- you have -- and I hope we will get agreement on this. This, as I say, is dependent upon both federal, state and industry cooperation, and this is a three-way deal. If, as I believe you do, we believe that you have to deal with both your waste treatment works and the discharges as one package and try to work out a system for the river. I think we should set up a group, where our technical staff will get to work on this and come up with a report.

This leads us down to the next point. By the way, I think, if we were going to do that, and the summary of this, of course, will be out in a few weeks -- but, if we were going to do that, Mr. Harold Taylor, whom you probably know, of our Atlanta Office, the Regional Director, will be the primary contact point and the man, if this is agreeable, for you people to establish this, and we will see what federal resources we can get in, as you wish.

I think we would have to have a report back to these people to see if we can do this, on your recommendations. I suspect that we will have to have the support of both states and us and the industry on a unified plan, if we are going to make any changes in reservoir regimen. I don't know if Corps people are here or if Federal Power people are here, but they have been, at least in Washington, fairly sympathetic to this kind of approach. The Federal Power Commission has realized that what they do on a dam, or don't do on a dam has a material effect on a river and has a material effect on water quality, and sometimes licenses in the past have been given out without any consideration of water quality.

This brings us back to the next point. If we -- and I would hope we would do this -- if we can hear from Riegel and Trion as to a schedule, and this is reasonably close to the other schedules,we no doubt can recommend that to the Secretary. In the alternative to that, I think we are faced with a proposition of the Secretary coming up possibly with his own recommendation; or, if he doesn't ask that they make reasonable progress, and every six months we are going to have to review this and possibly ask Alabama for its recommendations because, after all, they are the recipient of the pollution, to determine whether we have reasonable progress. Then, if there is a determination made, someone will call that to the Secretary's attention. I don't think that that is very satisfactory.

I think we would be in a much better situation -- we are so close to these dates now from two cities -- 1964, 1965 and 1966 -- that if we can get something from Riegel Textile, we can have a kind of a self-operating policing schedule within reasonable limits, that a time would be established that you people would think would be reasonable.

Again, to get back to the big Rome Kraft problem, if this arrangement takes place, we can go several ways. I don't know where the technical discussions will lead, or what the availability of the various groups is after they 're here. The problem may solve itself and it may be very easy to present.

However, if the technical group, involving the states, us and you, assuming that technical group is formed -- if that technical group gets together and recommendations are made, and the feeling of the group is that the purpose would be served by having another session of a conference to get the conference push formally behind it, we would be glad to consider that. Maybe that step won't be needed, but I think we should leave ourselves an escape hatch just in case that is the requirement, and we can reconvene another session on the call of the chairman.

Now I would hope, if we can set up a time schedule, that for the other municipal and industrial wastes we will not need another session of conference. If no time schedule is set up, and the

Secretary doesn't come up with one, we may be pushed into going through this to check progress to see if things are progressing reasonably -- and I would like to avoid that exercise if we can.

DR. MYERS: Mr. Chairman, I would like to observe that the request from Alabama has been fairly simple. We have asked that the water coming across the state line have at least 4.0 ppm dissolved oxygen. We have requested that there be some improvement in its appearance because of its objectionable quality, turbidity, odors, and so forth. We have also requested that the quality of the water be such that it would be safe for contact sports, and we have set those limits in a fairly liberal fashion.

We do not feel that we should be concerned at all in the internal mechanism of how Georgia might attain this. This is their problem. We are interested, we will do anything we can to help, but we figure that this is their problem and is an internal thing. It is within their state's rights to handle it.

We do not feel that these requests are unreasonable. We have found them to be entirely reasonable and consistent with standards set by other states.

CHAIRMAN STEIN: I think, unless Mr. Thoman has something, we completely agree.

DR. MYERS: I mean --

CHAIRMAN STEIN: Particularly with the notion that this is the internal mechanism and it is Georgia's problem, certainly not where they are concerned with the Federal Government.

DR. MYERS: One of our most urgent concerns is that there has been an increasing and continuing drop in the minimum values of dissolved oxygen that has been showing up. This has also been shown by the studies made by Rome Kraft. That has been our major concern, not only from the fish kills that have happened in the past, but the things that are bound to happen in the future because of changes which have been elucidated here today.

CHAIRMAN STEIN: Are there any further comments from the conferees?

DR. VENABLE: Yes, Mr. Chairman, I think I am going to have to say it straight out. I am sorry, but I challenge your authority on the basis that you do not have sufficient evidence to come to the conclusion with which you just agreed with Alabama. I don't dispute the facts, but I dispute your interpretation of the facts.

I am very happy that you ended the discussion of how you would interfere with internal operations in Georgia, by saying you would not. It makes me feel a little better to go home on. But this is the first time in my life I've ever heard a federal official stand here and talk to a state agency about their own plans, without consulting the state industries and without consulting the state agencies. And your conversation with Rome Kraft, bringing federal people into technical conferences on this. You did add, however, I'll admit, the postscript of "if the state is willing." But the whole discussion of how we would proceed to go ahead with the industry -- I think you've got to take a position on one side or the other; and, if you conclude from the data -- Alabama's, Rome Kraft's, and Mr. West's report that you have jurisdiction, that's your privilege and I'll have to bow to it.

I will want the record to show that I do not agree, and that you are interpreting data to your own advantage to take jurisdiction in this matter, if you so do.

CHAIRMAN STEIN: I think the summary, of course, will indicate your views, Dr. Venable. I think, also, the record will show in a colloquy I had with Mr. Boston, asking him about the facts of a time schedule for the industries, he indicated to me that he did not have them and I might best ask the cities and the industries from Alabama that, myself. I think a reading of the transcript will show that. My first question was directed to Mr. Boston, and he directed me to the industries.

DR. VENABLE: The schedules are fine, but for preparations for the future you went ahead and discussed it with the industry.

MR. BOSTON: May I say in that connection, Mr. Chairman, in this conference the question was asked about the time schedules, and I think, as well as I recall, that we followed in our own responsibilities closely the progress of these industries -- that these industries and cities are making, and I suggested that if there were any specific dates, and so forth, that it might be appropriate for you to permit these industries that have been named to state here in this conference. I just wanted to get that clear there.

CHAIRMAN STEIN: I think the record speaks for itself on that.

Does anyone else want to make a comment, correction, or suggestion? If not, I want to thank you all for coming.

DR. VENABLE: Is there going to be an executive session, or are you about to turn us loose?

CHAIRMAN STEIN: No, sir.

DR. VENABLE: I would still like to have your opinion on whether we have two agencies in or out of this report.

CHAIRMAN STEIN: Pardon? I'm sorry; I didn't understand that.

DR. VENABLE: We, a little while ago, delayed discussion as to whether or not an industry and the Army Engineers were a part of the proceeding.

CHAIRMAN STEIN: Yes, I think that is a very fair question. By the way, I had thought that was covered.

In the discussion, I think, if we are going to deal in terms of impoundment discharges and treatment of the wastes, obviously we are going to consider the effect of what the Corps of Engineers has on the river system in the water quality management. Now as far as the other situation is concerned, and this goes to the Public Health indication and the Department indication, it seems that the view that these people have is dealing with what they consider the fact, that the Celanese Corporation is discharging wastes that persist to the Alabama line, and that is contributing to pollution.

Now this company wasn't specifically mentioned in the summary, but when we said "other associated industries," we would imagine that in the normal operation of the Georgia program in the clean-up which you have evidenced you are having of the Coosa River System, that this would be taken care of.

Are there any further questions or comments?

(No response.)

If not, I would like to thank you all for coming and I would like to say, as far as I can see, I think this has been a productive conference, and we are all working for cleaner waters in the Coosa River System.

Thank you very much. The conference is adjourned.

(Whereupon, at 6:35 o'clock, p.m., August 27, 1963, the conference in the above-entitled matter was adjourned.)

☆U.S. GOVERNMENT PRINTING OFFICE: 1972-484-487/299-I-3